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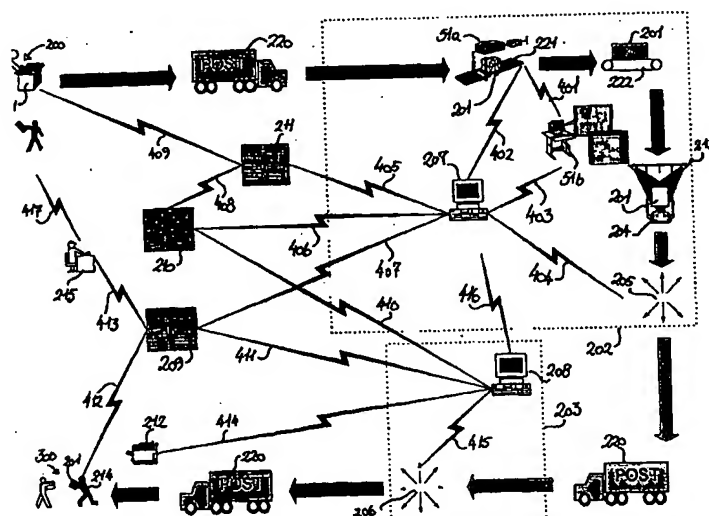
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(54) Title: A METHOD AND A SYSTEM FOR PROCESSING POSTAL ITEMS



(57) Abstract

A method and a system for automatically or semi-automatically processing postal items, wherein items are conveyed along a first system for capturing a first address signal from address identification means, such as a bar code, a printed or written address block or a radio frequency tag, optionally provided on the items. The address signal is processed in order to determine whether or not it is sufficient in order to automatically sort and distribute the item, and a further address signal may be derived. The items are sorted according to their respective address signals. OCR and/or video equipment may be applied for capturing identification data, and a cross-belt or tilt-tray conveyor system may be applied for sorting items. Discharge stations may comprise a post-sorting or post-conveying system for rearranging and circulating a plurality of items. The postal items may comprise, e.g., letters or parcels.

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A METHOD AND A SYSTEM FOR PROCESSING POSTAL ITEMS

Technical field

- 5 The present invention relates to a method and a system for processing postal items at an item processing installation such as, e.g., a postal terminal. In particular, the present invention relates to a system and a method comprising a sorting conveyor and a Optical Character Recognition (OCR) system combined with a video coding (VC) system for automatic or semiautomatic capturing of a printed or written address block
- 10 provided on a postal item. As an alternative or supplement to the OCR and VC system, a radio frequency tag (RF tag) system may be applied. The present invention relies on an OCR system, a VC system and an RF tag system known *per se* from the prior art.

15 Background of the invention

- The volume of mail sent world wide has been continuously growing for the past decades, and different measures have been developed in order to handle the growing volume of mail. In particular, methods relying on automatic means for reading
- 20 addresses provided on postal items have been developed. One means of automated mail processing used today relies on optical character recognition (OCR). The OCR is capable of scanning an address block on an envelope and processing it so as to derive a machine-readable alphabetic or numeric code. Furthermore, systems relying on cameras, such as CCD cameras have been developed for automatically capturing and
- 25 processing an image of an address provided on a postal item.

- As an alternative to such systems, system relying on pre-printed envelopes being provided with a bar code of phosphorescent ink encoding that allows machines to automatically read address information off the envelope without the need for camera
- 30 or OCR-systems. Such systems have, however, not led to a significant improvement of the efficiency in handling postal items since only a small fraction of the total number of envelopes are or have been provided with such a bar code.

In the prior art different methods for automatic mail processing have been suggested. EP O 424 728 B1 discloses a method for deferred processing of OCR scanned mail. The method relies on OCR and image scanning techniques coupled with knowledge based operator-assisted disambiguation and validation of the address data.

5

EP O 606 124 A1 discloses a method for sorting objects according to destination. The objects are placed on a transport system and supplied to various destination stations, in which the objects are delivered in accordance with the address indication. The address indications are detected by means of one or more cameras near the supply

10 end of a transport system.

WO 97/49503 discloses a method of processing postal matters in an automatic address-reading system. The system comprises a first address evaluation system and a video coding system. In case the first address evaluation system fails to capture and
15 evaluate and image of the address of a postal item, the item is passed to the video coding system.

EP O 425 890 discloses a sorting line for processing envelopes, particularly for photographic laboratories.

20

Further related system are known from EP O 589 119 A1, US 4,992,649, EP O 635 314 A1, EP O 584 607 A2, US 5,697,504 and US 5,770,841.

The invention disclosed herein address the problem of performing with reliability an
25 improved automatic sorting and distributing of postal items.

Summary of the invention

It is therefore an object of the invention to provide an improved technique for
30 processing OCR-scanned postal items or postal items whose address block has been captured by means other than OCR-scanning. It is another object of the invention to provide an improved method for multi-stage processing of postal items, in particular to provide an improved method for such processing in case different mail processing installations are arranged with long distances therebetween. It is a further object of

the invention to provide a system which is capable of automatically handling different sized postal items, including as well envelopes as parcels. It is a still further object of the invention to provide an improved method for automatically processing postal items originating from entities sending a relatively large number of postal items, such as, e.g., corporate entities. It is a further object of the present invention to provide a method and a system having a reduced failure rate when determining identification codes of postal items in relation to prior art systems. It is a still further object of the present invention to provide a system which is not necessarily dependent on the up- and down-side orientation of the items to be processed.

10

Thus, according to a first aspect, the present invention provides a method for processing postal items, each item being sent from a departure location to a destination location, the method comprising:

15 (a) delivering items to an item receiving part of a first item processing installation, the first installation being adapted to collect and process items from a plurality of departure locations and comprising one or more first control systems for controlling the processing of items,

20 (b) conveying each item along a first system for capturing a first address signal from address identification means optionally provided on the items,

(c) processing the first address signal to derive first address data,

25 (d) passing the first address data to a first computer system comprised in the at least one first control system,

(d_ii) processing the first address data of an item in order to determine whether or not it is sufficient in order to automatically sort and distribute the item in question, and

30 - if the first address data is sufficient: going to step (e),
- if the first address data is insufficient: going to step (f),

(e) comparing the first address data to second address data previously stored in a first database comprised in or connected to the first computer system, and

- if the first address data of an item is identical or nearly identical to an entry of second address data in the first database: associating a unique address identification code the item in question and going to step (g),
 - if the first address data of an item is not identical or nearly identical to any entry of second address data in the first database: associating an error code to the item in question and going to step (g) or transporting the item in question to further manual or automatic processing thereof,
- 5
- (f) conveying the items along a second system for capturing a second address signal from the address identification means or for further processing the first address signal, and
- 10
- processing the first or the second address signal to derive third address data,
- 15
- ensuring by automatic or manual means that the third address data is sufficient in order to automatically sort and distribute the item in question,
 - storing the third address data as the first address data and going to step
- 20 (e),
- (g) conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by
- 25 the first computer system,
- (h) discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the unique address identification code or according to the error code,
- 30
- (j) optionally transporting the items for further processing thereof or delivery thereof at the respective destinations,
- the method being applicable postal items of various sizes.

An advantage of the method according to the invention is that it may be easily combined with existing sorter conveyor systems due to the compatibility of the system with existing control systems of conveyors which may be installed at mail processing installations or plants. A further advantage of the method according to the invention is that it provides the possibility of performing full-automatic processing of postal items. A still further advantage is that it may be designed such that an item processed passes through no or only a single scanning device during its complete processing from the departure location to the destination location. A further advantage is that the method is capable of handling postal items of various sizes. Thus, preferably as well letters as flats, parcels and packets may be processed. In particular, letters and flats having a thickness over 5 mm, such as preferably over 10 mm may be processed, such as flats having a thickness of up to 40-50 mm or more. Preferably, also packets having various dimensions may be processed. Preferably, packets having dimensions of up to 1.2 m x 0.7 m x 0.7 m or more may be processed.

Step (b) comprises capturing first address signal by means of a radio signal received from radio transmission means comprised in the address identification means. Thus, the address identification means may comprise, e.g., a radio frequency tag (RF tag) provided on all or some of the items. Compared to systems, wherein the address signal is optically captured, the RF tag layout has the particular advantage that the address signal may be captured regardless of the up/down-side orientation of the items. Accordingly, items may be processed irrespective their orientation which eliminates or reduces the need for machinery and/or labour work ensuring correct orientation of items. A method and system, wherein postal items are processed according to a radio signal provided by radio signal transmission means in or on each item is independently claimed in the present application.

A particular advantage of the present invention is that the method and the system provided is capable of handling items wherein an address block or label printed or written on an item is not positioned at a predetermined location. Thus, in the present method, the first image preferably having a relatively high resolution, such as, e.g., 200 dpi, is being captured and stored at a computer comprised in or connected to the one or more first control systems. The first image is then being processed so as to

generate a modified first image preferably having a relatively low resolution. The modified first image is processed in order to determine a region of interest (ROI) in which the address block or label is assumed to be located. When the ROI has been determined, the first image is re-processed in order to derive the first address data
5 therefrom.

In the present context, the terms "control system" should be understood as a system comprising one or more processors comprised, e.g., in one or more computer systems and storage means such as, e.g., one or more databases. Accordingly, the databases
10 and computer systems mentioned herein are comprised in the control systems mentioned, unless otherwise specified. The computer systems and/or databases mentioned may be comprised in one than more control system. The term "database", "database system" or "database unit" should be understood as a computer system or other suitable system for storing and processing data. Thus, the databases, database
15 systems and database units comprise processing means, unless otherwise specified.

Though all the process steps (a)-(j) specified above are considered essential to the present invention, some of the steps may be bypassed under certain circumstances as specified below.

20

The first address signal may be captured while the item in question is being conveyed along the sorting conveyor. The sorting conveyor may be any kind of suitable conveyor, such as, e.g., a tilt tray conveyor or a cross-belt conveyor known *per se* from the prior art. The second address signal may be captured while the item in
25 question is being conveyed along the sorting conveyor. The further processing or capturing of the first image is preferably carried out by a video coding system. The video coding system may comprise that the first image is displayed to a human on a monitor, the human entering first, second and/or third address data to the control system manually or semi-automatically. A browser displaying possible or likely address
30 particulars, such as, e.g., street names, city name, zip codes or countries may be available to the human.

The second address signal, such as, e.g., the second image, may be captured by a human, the information provided by the second image being passed to the first

computer system by manually entering the information. A combination of a human capturing the second image and the video coding system capturing the image may be provided. Thus, some of the data provided by the address block may be captured by the video coding system and some of the data may be captured by the human. Other means for capturing the second image may be provided, such as a CCD-camera or an OCR-system.

Preferably, step (e) further comprises performing spelling checking at least part of the first address data so that misspelled address information may be automatically corrected.

According to a further aspect, the present invention provides a method for processing postal items, each item being sent from a departure location to a destination location, the method comprising:

15

(a) providing an item with an optically readable identification code in a standard format at the departure location, the identification code corresponding to a unique address identification code stored at a storage means comprised in a computer system comprised in or connected to a first control system comprised in a first item

20 processing installation,

(b) delivering items to an item receiving part of the first installation, the first installation being adapted to collect and process items from a plurality of departure locations and comprising one or more first control systems for controlling the processing of items,

25

(c) passing the identification code together with a destination code of the item from the departure location to at least one of the one or more first control systems, the destination code identifying the address of the destination location of the item,

30

(d) storing the destination code in the storage means and processing the destination code so as to associate the destination code to the corresponding unique address identification code,

- (e) capturing the identification code at the item processing installation by means of a code scanning device adapted to pass the identification code to at least one of the one or more first control systems,
- 5 (f) processing the identification code so as to associate the corresponding unique address identification code to the item,
- (g) conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items
- 10 being conveyed along the sorting conveyor, discharging of items being controlled by a first computer system comprised in the one or more first control systems,
- (h) discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the identification
- 15 code associated to the item in question,
- (j) optionally transporting the items for further processing thereof or delivery thereof at the respective destinations.
- 20 The features cited in the connection with the second aspect of the present invention may be and are preferably the same features as cited in connection with the first aspect of the present invention.

In all aspects of the invention, the identification code may comprise a radio frequency tag. In the present application, the term "radio frequency tag" or "frequency tag" may, e.g., comprise a micro chip as described in "Ein Mikrochip führt den Reisekoffer sicher ans Ziel" by Manuela Stabagy in "Welt der Wissenschaft", 27 December 1995 issue.

In the present application, the term "unique address identification code" should be understood as any code which at a given stage is sufficient in order to process an item. Thus, in a coarse sorting operation, the unique address identification code may, e.g., comprise only the country and/or the city and/or the zip code of the destination location, whereas in a fine sorting operation which may, e.g. be carried out at a

further item processing installation, the unique address identification code may, e.g., further comprise street name, street number and optionally name of the addressee.

Step (d) may comprise the step of verifying the destination code and/or the unique address identification code. A person or an entity sending a postal item may know the unique address identification code of one or more items and may optionally pass the unique address identification code to the one or more first control systems.

A particular advantage of a method according to the second aspect of the invention is that it combines the benefits of providing items with a pre-printed or pre-written standard code, such as a bar code, and the benefits of known OCR-systems or other systems for automatic capturing of address blocks.

The method may further comprise, prior to or during step (e), the step of determining whether the identification code is present on the item and in such case whether it is readable by the code scanning device. The method according to the second aspect may further comprise the step of processing the item in question by a method according to the first aspect of the invention in case step (e) or (f) of the method according to the second aspect fails or in case the identification code is not present or unreadable, the first item processing installation of the method according to the first aspect being the first item processing installation of the method according to the second aspect.

The identification code may be scanned while the item in question is being conveyed along the sorting conveyor. Preferably, the identification code is being scanned by means of the same device as the device by means of which an image of the address block is being captured, i.e., preferably by the OCR-device or the OCR-system.

The features described in the following applies to the first as well as the second aspect of the present invention.

The method may further comprise the step of weighing at least some of the items being processed at the first installation. Preferably, items are weighed by means of an electronic weight operationally connected to one or more of the control systems.

- Thus, the method according to the invention may further comprise the step of passing weight information representing the weight of the item in question to a computer system comprised in the at least one first control system. Furthermore, the method may comprise the step of automatically measuring or scanning the volume of at least some of the items being processed at the first installation, the measuring or scanning being performed by means of a volume scanning system. A volume scanning system known *per se* from the prior art is preferably provided for scanning or measuring volume of items. The measuring or scanning may be performed on the sorting conveyor while the item in question is being conveyed along the sorting conveyor. The volume scanning system may be operationally connected to the one or more control systems, so as to allow for volume information representing the volume of the item in question to be passed to a computer system comprised in the at least one first control system.
- 15 The method may further comprise, subsequent to step (j), transporting a plurality of items from the first installation to a second item processing installation, the second item processing installation being adapted to further process the items. Whereas the first item processing installation is typically a main mail center, such as, e.g., the main mail center of a city, a district or an airport, the second item processing installation is typically a main center or a post office of a city or a region. The processing of items at the second mail processing installation may be the final processing, and the items may be delivered directly to their respective destination locations from the second mail processing installation. Alternatively, from the second installation, items may be transported to one or more further item processing installations optionally provided.
- 25 The items may be delivered to their respective destinations by courier service or by mail delivery service.

In the present application, any item processing installation may comprise a postal item singulating system for singulating items. In particular, a postal item singulating system may comprise the system described and claimed in U.S. provisional patent application filed 29 July 1998 and assigned to the present applicant, the content of which patent application is hereby included in the present application.

Any item processing installation, in particular the first item processing installation may comprise a postal item check-in system. In the present application, such a postal item check-in system may comprise a system as described and claimed in Danish patent application No. PA 1998 00997, the content of which patent application is hereby
5 included in the present application.

The unique address identification code preferably represents one or more of the following particulars of the destination location: city or local district, street name, street number, country or country code. The unique address identification code may
10 further represent or contain other information, such as data related to sortation patterns, sortation sequences and/or information about a given discharge station assigned or associated to the item in question for use during the further processing of the item. The unique address identification code may further represent the name of the addressee.

15

The method may further comprise, subsequent to step (c) of the method according to the second aspect of the invention, comparing the destination code and/or the unique address identification code to second address data previously stored in a first database comprised in or connected to the one or more first control systems in order to verify
20 the destination location of an item. This may include that, if a change of address of an addressee of an item in question has been recorded in the control system, the unique address identification code which is assigned or associated to the item in question represents the updated address of the addressee. The method may further comprise that the address provided on the item is compared to the unique address identification
25 code assigned to the item, e.g. at the discharge stations of the sorting conveyor. The method may further comprise that an address label is printed on attached to an item if, e.g., a change of address of an addressee has been recorded. The method may also comprise that, if an item has been discharged at a wrong discharge station or is believed to have been discharged at a wrong discharge station, the item in question is
30 returned to the address capturing system and that steps (b)-(j) are repeated, or that an address label is printed and attached to the item.

In the method according to the invention, the one or more first control systems comprised in the first installation are connected to an exterior database in which

names and address of a large number of persons is stored, the first control system or the exterior database comprising or being connected to a database comprising non-modified second address data and modified second address data, the method further comprising:

- 5 - automatically associating the unique address identification code corresponding to the modified second address data to an item in case the first address data or the destination code correspond to the non-modified second address data.

The exterior database may comprise or be connected any public or non-public
10 database or register, such as, e.g., an administrative person or company register of a country, a region or a city. The exterior database is preferably updated at regular intervals in accordance with updates of, e.g., company or entity names, or addresses. In particular, the exterior database is preferably updated or modified when a person or an entity/a company moves from one location to another. Preferably, both the
15 updated/modified as well as the old or unmodified data/particulars are stored at the exterior database or at a database comprised in or connected to the first control system. The method according to the invention may comprise that an item having a destination location whose particulars have been recently modified are being flagged. Items may be flagged physically by means of, e.g., a label attached to an item, or
20 they may be flagged electronically in the control system.

The postal items may be any kind of items, including mail items, such as envelopes or parcels, and the first and second systems for optically capturing an image of the address block may comprise auto focusing systems.

25

The method may further comprise, prior to step (g), bypassing all or some of steps (b)-(j) in case the weight and/or the dimensions of a postal item exceeds previously determined limits. Weight and/or volume beyond the previously determined limits may be determined either automatically or manually. Furthermore, information indicating
30 volume and/or weight of items may be passed from a sender of an item to the one or more control systems.

The method may comprise carrying out determining the identification code of an item or capturing the first and/or the second image of the item while performing other

operations, e.g., measuring/scanning the volume of an item or weighing it. In such case, an item may be placed on or moved past a transparent surface through which, e.g. optical equipment may capture one or more images.

- 5 The method may further comprise, subsequent to step (j), transporting at least some of the items to a second item processing installation for further processing of the items. The second mail processing installation may, e.g., be an installation of the above-mentioned type. The second item processing installation may comprise a second control system for controlling processing of items, the second control system
10 being connected to the one or more first control systems, and the method may further comprising, subsequent to step (e) or (f) in a method according to the first aspect of the invention or subsequent to step (c) in a method according to the second aspect of the invention:

- (I) passing destination information, such as the unique address identification code,
15 together with item identification data from the first control system to the second control system, and

(II) providing each item with an optically readable item identification code.

- Thus, data may be transferred between item processing installations in a fast and efficient way, and items may be efficiently processed at the second item processing
20 installation. As mentioned above, further item processing installations may be provided, and in such case, such further installations may be operatively interconnected.

- The method may comprise capturing the optically readable item identification code at
25 the second item processing installation and deriving therefrom the corresponding item identification data and destination information. Items may be further processed or sorted items according to the respective destination information. The method may further comprise passing a table comprising item identification information and destination information associated to a plurality of items from the one or more first
30 controls systems to the second control system or from the second control system to a third control system comprised in a third item processing installation optionally provided. The method may comprise, at the second or the third control system, processing the destination information assigned or associated to each item, so as to derive the address of the destination location from the destination information.

The method may further comprise printing the table and/or a list of addresses of destination locations of items and delivering the items associated to the item identification information listed or stored in the table at the respective destination locations of the items, so as to facilitate distributing of items, in case the items are not automatically transported to their respective destination locations.

- In a method according to the invention, a plurality of second item processing installations may be provided. In such case, step (I) as described above preferably
- 10 comprises passing the destination information together with item identification data from the first control system to the respective second control systems in accordance with the destination information, whereby destination information and item identification information associated to an item being transported to a certain second item processing installation is being passed to that second item processing installation.
- 15 Thus, for a example, an item being transported from a main mail center, i.e. the first item processing installation, to a city mail center, i.e. the second item processing installation, is followed by associated information needed at the second item installation for further sorting, distributing and/or other processing of the item.
- 20 In a method according to the invention, the step of capturing the first image of a printed or written address block provided on items and/or the step of scanning the optically readable identification code may be carried out by means of an optical character recognition system which may comprise an automatic auto focusing facility.
- 25 The method may further comprise the step of passing data to an item tracking database connected to or comprised in the one or more first control systems, in the second and/or in the third control system when an item has been delivered at a destination location or at other events during the steps of processing an item. The item tracking database may be used for tracking items during processing thereof or for
- 30 tracking of lost items. It may further be used for automatic billing or invoicing of carriage costs.

The method may further comprise passing volume and/or weight data from the one or more first control systems to an account database connected to or comprised in an

account computer system. The account computer system may be connected to or comprised in the item tracking database, and in such case the method according to the invention may comprise automatically invoicing carriage costs by:

- computing the carriage costs in dependency of the weight and/or volume of an item and optionally in dependency of one or more further factors,
- printing an invoice and sending it to a debtor and/or electronically forwarding the invoice to the debtor and/or automatically drawing the debit from an account of the debtor.

10 A plurality of item tracking databases and/or a plurality of account computer systems are preferably provided, and the steps of passing data to/from the tracking databases and/or the account computer systems may comprise passing the data to a selected one of the plurality of item tracking databases and/or to a selected one of the plurality of account computer systems, respectively.

15

The method may further comprise generating a sortation sequence or sortation pattern in the one or more first control systems or in the second control system, the sortation sequence or sortation pattern comprising information as to the sequence of further sortation of a plurality of items. The sortation sequence or sortation pattern may be

20 used at the first and/or at the second item processing installation as well as in distributing of items and during final delivery of items at the respective destination locations. The sortation sequence or pattern is preferably generated in the one or more first control systems, and the method may comprise passing the sortation sequence or sortation pattern from the one or more first control systems to the second control

25 system or to another control system.

The sortation sequence or sortation pattern may be determined from the unique address identification code. Thus, e.g., the country and/or any other particular of the destination location of an item represented by the unique identification code may

30 determine the discharge station of that item.

The sortation sequence or sortation pattern may at any stage be determined in accordance with one or more parameters in order to provide for an optimal and maximally efficient distribution of the items. Thus, the method may comprise taking

into consideration the size and/weight of an item, the route for the final distribution/transportation of the item, the size of a given car or truck which is being used in the final distribution/transportation.

- 5 The method may further comprise generating sortation data or sortation information for a plurality of items at the departure location prior to step (b) in the method according to the second aspect of the invention and passing such data or information to the one or more first control systems directly or through a sortation data generating computer system. Thus, a customer, such as, e.g., a corporate entity, has the
- 10 opportunity to define the sortation sequence and/or the sortation pattern of items sent by him/her. The sortation data or sortation information may be generated at a central computer which may, e.g., be connected to a plurality of first control systems of a plurality of item processing installations.
- 15 Information may be passed from the sortation generating computer system to the account computer system or to the tracking database or from the account computer system or from the tracking database to the sortation generating computer system. A plurality of sortation data generating computer systems are preferably provided, and the method may comprise passing sortation data from the plurality of sortation data
- 20 generating computer systems to the one or more first computer systems.

The account computer system(s), the sortation data generating computer systems and/or of one or more other systems or database may be placed at a location different from the first and the second item processing installation. Thus, such systems may be

25 placed at, e.g., corporate customers, or at parcel distributing entities owning or collaborating with the entity running the first, second and/or other item processing installations.

According to a third aspect, the present invention relates to a system for processing

30 postal items, each item being sent from a departure location to a destination location, the system comprising:

- an item receiving part for receiving items at first item processing installation, the first installation being adapted to collect and process items from a plurality of departure

locations and comprising one or more first control systems for controlling the processing of items,

- a first system for capturing a first address signal from address identification means
5 optionally provided on the items,

- means for processing the first address signal to derive first address data,

- means for passing the first address data to a first computer system comprised in the
10 at least one first control system,

- processor means for processing the first address data of an item in order to determine whether or not it is sufficient in order to automatically sort and distribute the item in question,

15

- processor means for comparing the first address data to second address data previously stored in a first database comprised in or connected to the first computer system,

and

20

- means for associating a unique address identification code to the item in question,

- means for an error code to the item in question,

25 - means for transporting the item in question to further manual or automatic processing of the item,

- means for conveying the items along a second system for optically capturing a second address signal from the address identification means or for further processing

30 the first address signal, and

- processor means for processing the first or the second address signal to derive third address data,

- means for ensuring by automatic or manual means that the third address data is sufficient in order to automatically sort and distribute the item in question,
- 5 - storage means for storing the third address data as the first address data,
- a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by the first computer system,
- 10 - a plurality of discharge stations arranged along the sorting conveyor, the discharge station being automatically selected by the first computer system according to the unique address identification code or according to the error code,
- 15 - optionally means for transporting the items for further processing thereof or delivery thereof at the respective destinations.
- The system according to the third aspect of the invention may further comprise means for carrying out some or all of the method steps described above in connection with
- 20 the first and second aspects of the invention.
- According to a fourth aspect, the present invention relates to a system for processing postal items, each item being sent from a departure location to a destination location, the system comprising:
- 25 - means for providing an item with an optically readable identification code in a standard format at the departure location, the identification code corresponding to a unique address identification code stored at a first storage means comprised in a computer system comprised in or connected to a first control system comprised in a
- 30 first item processing installation,
- delivering means for delivering items to an item receiving part of the first installation, the first installation being adapted to collect and process items from a plurality of

departure locations and comprising one or more first control systems for controlling the processing of items,

- means for passing the identification code together with a destination code of the
5 item from the departure location to at least one of the one or more first control systems, the destination code identifying the address of the destination location of the item,
- second storage means for storing the destination code in the first storage means and
10 processing the destination code so as to associate the destination code to the corresponding unique address identification code,
- scanning means for scanning the optically readable identification code at the item
15 identification code to at least one of the one or more first control systems,
- processing means for processing the identification code so as to associate the corresponding unique address identification code to the item,
- 20 - means for conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by a first computer system comprised in the one or more first control systems,
- 25 - means for discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the identification code associated to the item in question,
- 30 (j) optionally means for transporting the items for further processing thereof or delivery thereof at the respective destinations.

The system according to the fourth aspect of the invention may further comprise means for carrying out some or all of the method steps described above.

According to a further aspect, the present invention relates to a method for processing postal items at a first item processing installation comprising a control system, the method comprising:

5

(a) identifying each item by means of first item identification means operationally connected to the control system and passing a first identification signal from the identification means to the control system,

10 (b) identifying each item by means of second item identification means operationally connected to the control system and passing a second identification signal from the identification means to the control system,

(c) determining and processing address data optionally provided on or comprised in
15 each item by means of an address identification means and passing an address signal from the address identification means to the control system,

(e) associating the first and second identification signals to the address signal of each item,

20

step (e) being performed in the control system.

The system may optionally comprise scanning/measuring the volume of an item, weighing the item and/or performing other operations.

25

By identifying each item twice by means of first and second item identification means, respectively, the failure rate when determining the identification code of an item may be considerably reduced in comparison to methods and/or systems wherein the identification code is only determined once. For example, when the first and second
30 identification means each have a success rate of 90%, then the total success rate may ideally be 90% at the first identification means plus 90% at the second identification means of the remaining 10% from the first identification means, i.e. 99% in total. If the success rate when deriving the address data is, e.g., 90% as well, then the total success rate of determining item identification and address data may

ideally be improved from $0.9 \times 0.9 = 0.81$ to $0.99 \times 0.9 = 0.891$, i.e. from 81% to 89.1%. Equivalently, a further address identification means may be provided. Three, four, five or more item identification means and/or address identification means may be provided.

5

Accordingly, the efficiency of a postal item processing installation may be improved considerably by applying the above method.

The first and second item identification means may comprise substantially identical systems/means or they may comprise systems/means of different types: Thus, step 10 (a) and/or step (b) may comprise the step of scanning a bar code provided on all or some of the items, the first and/or second item identification means, respectively, comprising one or more bar code scanners. Additionally and/or alternatively step (a) and/or step (b) may comprises identifying all or some of the items by means of a radio 15 frequency tag optionally comprised in or on each item.

Steps (a) and (c) may occur simultaneously. Steps (a), (b) and (c) may be performed in any order or they may occur simultaneously. Preferably at least some of steps (a)-(e) occur while the item subjected to those steps is being conveyed along a conveyor.

20

The first and/or the second item identification means is comprised in the address identification means. Thus, if the address identification means, e.g., comprise an OCR system, then that OCR system may also be adapted to read, e.g., a bar code constituting the item identification code.

25

Preferably the conveyor or the conveyor system comprises a plurality of conveyor portions moving along the conveyor system, the conveyor system further comprising conveyor portion locating means for determining the respective locations of the conveyor portions in the conveyor system, the method further comprising the steps

30 of:

(i) associating a selected conveyor portion to each item,

(II) in case step (a), (b) and (c) do not occur at the same location along the conveyor system:

5 (II.1) carrying out a first one of step (a), (b) and (c) at a first location along the conveyor system,

(II.2) carrying out a second one of step (a), (b) and (c) at a second location along the conveyor system,

10 (II.3) carrying out a third one of step (a), (b) and (c) at a third location along the conveyor system,

(II.4) tracking each item by means of the conveyor portion locating means while carrying out steps (II.1)-(II.3),

15

so as to, in the control system, associate data representing the first and second identification signals and the address signals of each item to each other.

Thus, a physical area of the conveyor system, e.g., a cart or a tray, is associated to
20 an item. A conveyor portion identification code is preferably stored in the control system together with the data/the signals derived at steps (a)-(c). This is a particular advantage if, e.g., step (a) is being carried out at a location on the conveyor downstream of the locations at which, e.g., steps (b) and (c), respectively, are being performed. If step (a) fails, then the method outlined above allows to track the item as
25 the control system keeps track of the physical location of the item along the conveyor system.

While carrying out steps (a)-(c) and steps (II.1)-(II.4), a table stored a storage means comprised in the control system is preferably updated with the information/the data
30 derived at those steps.

Due to the fact that different item identification means are sensitive of different impacts, it is particularly advantageous that the first and second item identification means rely on different principles.

The conveyor portion locating means may comprise optically readable means for identifying, e.g., the carts of a conveyor system comprising such carts having, e.g., tilt trays or cross belts mounted thereon. The conveyor portion locating means may
5 comprise magnetic means and/or frequency/radio frequency means.

According to a further aspect, the present invention provides a system for automatically processing a plurality of postal items comprising packets and/or parcels, the system comprising one or more of the following features:

10

- a postal item check-in system,

- a postal item singulating system,

15 - a system according to claim 45 and/or a system according to claim 47.

Such a system is particularly advantageous as it allows for full-automatic processing of postal items, in particular when the postal items comprise packets or a mix of packets and letters and/or flats.

20

According to a further aspect, the invention provided a method for sorting postal items, the method comprising:

(a) conveying the items along a sorting conveyor comprising a plurality of discharge

25 stations and a control system,

(b) discharging each item at a discharge station selected by the control system according to one or more destination particulars of the item,

30 (c) collecting a plurality of items at a discharge station and rearranging the items at the discharge station according to their destination particular(s), so as to provide for an optimal further transport of the items.

All or some of the discharge stations may comprise a chute. All or some of the chutes may comprise a pater noster system rearranging and circulating a plurality of items during the process of sorting a plurality of items at the sorting conveyor. The pater noster system may comprise a conveyor which is capable of conveying and/or re-
5 circulating items in a horizontal and/or in a vertical plane. The conveyor may, e.g., comprise tilt trays or cross belts for carrying and unloading items. The pater noster system may, e.g., be based on the invention of international application No. PCT/DK98/00586.

- 10 It should be understood that, though the present invention relates to a number of independent aspects, any combination of these aspects is possible within the scope of the present invention.

Brief description of the drawings

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Fig. 1 is a diagrammatic illustration of a preferred embodiment of a OCR/VC system according to the invention and the interfaces between computer systems comprised in the OCR/VC system according to the invention,

- Fig. 2 is a system overview diagrammatically illustrating the computer systems
20 comprised in the system according to the present invention,

Fig. 3 is a diagrammatic illustration of a sortation database and computer system comprised in a preferred embodiment of the system according to the invention,

Fig. 4 is a diagrammatic illustration of the interfaces to a sortation database system comprised in the preferred embodiment of the system according to the

25 invention,

Fig. 5 is a diagrammatic illustration of the interfaces to a sortation database unit comprised in the preferred embodiment of the system according to the invention,

Fig. 6 is a diagrammatic illustration of an automatic sortation system comprised in the preferred embodiment of the system according to the invention,

- 30 Fig. 7 is a diagrammatic illustration of the function of sorting tables,

Fig. 8 is a flow sheet illustration of a part of the information flow in a system according to the present invention,

Fig. 9 is a flow sheet illustration an encoding procedure,

Fig. 10 is a diagrammatic illustration of interface H shown in Fig. 1,

Fig. 11 is a flow sheet illustration of a first sortation table system,

Fig. 12 is a flow sheet illustration of a second sortation table system,

Fig. 13 is diagrammatic illustration of information flow between a sortation subsystem and a database unit comprised in a preferred embodiment of a system

5 according to the invention,

Fig. 14 is a diagrammatic illustration of a system according to the invention for automatic sorting of postal items.

Detailed description of the drawings

10

Fig. 14 is an illustration of a system for processing postal items according to the invention which is suitable for carrying out a method according to the invention. The system is suitable for processing a postal item, such as a parcel 201, being sent from a departure location 200 to a destination location 300. The parcel 201 is transported
15 by a transporting means, such as a truck 220, from the departure location to a first item processing installation, such a mail center 202. At the mail center 202, the parcel 201 is conveyed along a conveyor section 221. At the conveyor section 221, the parcel 201 is conveyed along an OCR-system 51a for optically capturing a first image of a printed or written address block provided on the parcel 201. In case the
20 OCR system is capable of capturing and successfully processing an image of the address block, the data resulting from the OCR capturing is passed to a first computer system 207 as indicated by the flash arrow 402, and the parcel 201 is processed further as described below. In case the OCR system is not capable of capturing an image of the address block or in case the OCR system is not capable of successfully
25 processing the image, an indication thereof is passed to a VC system 51b as indicated by the flash arrow 401. At the VC system, the address block is automatically or semi-automatically captured, and the data resulting from the processing of capturing the image at the VC system is passed to the first computer system 207 as indicated by the flash arrow 403.

30

The first computer system 207 and any processor and/or data storage means comprised in the OCR-system 51a and in the VC-system 51b is comprised in or connected to a first control system which controls the processing of items or parcels 201 at the mail center 202. The first computer system 207 comprises or is connected

to a first database in which second address data have previously been stored. Each entry of second address data in the first database corresponds to a unique address identification code. The address data resulting from the processing of capturing the image at the OCR or at the VC system is compared to the second address data, and if possible a unique address identification code is associated to each item. Otherwise, another address identification code, such as, e.g., a country code, is associated to each item. An item identification code is associated to each item, and a table of item identification codes and corresponding address identification codes is created and stored at the first computer system 207. A label representing the item identification code of each item 201 is printed on or attached to each item 201 prior to or subsequent to the OCR- and/or VC-scanning of the item as described above. The label represents the item identification code in a standard optical format. The label may, for example, comprise a bar code.

15 In case a large number of items 201 are sent from a single departure location 200, the label representing the item identification code may be provided on the items 201 at the departure location 200. A table containing a list of item identification codes and corresponding destination address data may be passed from the departure location 200 either directly or via a distributing entity's computer system 211 to the first computer system 207, as indicated by flash arrows 409 and 405. The destination address data may comprise the unique address identification code or other address identification data, such as, e.g., name of a recipient, street name and street number, city, zip code, country name or country code and/or other appropriate data. In case the destination address data do not comprise the unique address identification code, the destination address data are processed at the first computer system 207 in order to associate the unique address identification code to each item 201. If an item identification code has been provided on an item before the item has reached the mail center 202, only the item identification code is captured by the OCR-system 51a which is capable of capturing the item identification code.

30 An item which has been provided with an item identification code before the item has reached the mail center 202 is referred to as and IT-item.

When the data resulting from the OCR- or the VC-process have been passed to the first computer 207, the parcel 201 is conveyed to a weighing section 222. The weighing section 222 is preferably equipped with an electronic weighing system which is capable of passing weight data to the first computer system 207. Before the
5 parcel 201 is being passed to a sorting conveyor 204, a optically readable parcel identification code is attached or printed on the parcel 201.

From the weighing section, the parcel 201 is fed onto the sorting conveyor 204 for sorting items. At the sorting conveyor 204, the parcel 201 is conveyed along or past a
10 volume scanning system 213 for measuring or scanning the volume of the parcel 201. Preferably, the volume scanning system 213 is capable of passing volume data to the first computer system 207 together with parcel identification information. The parcel identification information is preferably derived from the parcel identification code.

15 From the sorting conveyor 204, each parcel 201 is discharged at a selected one of a plurality of discharge stations, as indicated by arrows at 205. The discharge station at which a given item is to be discharged is selected by the first control system, e.g., by the first computer system 207. As indicated by flash arrow 404, the first computer system 207 sends a signal to control means comprised in the discharge stations 205.
20 At the discharge stations 205, means are provided for capturing the optically readable identification code so as to identify any parcel being conveyed along a discharge station.

In the example shown in Fig. 14, the mail center 202 is a main mail center of, e.g., a
25 region, a city or country, at which mail from a plurality of departure locations 200 is collected. Items 201 may be transported either directly from their respective departure locations 200 to the mail center 202, or items 201 may be transported from their respective departure locations 200 to a mail box, a post office or another location (not shown) and from there to the mail center. At the mail center 202, a first processing
30 and sortation of the items 201 is carried out as described above. The first processing and sortation results, e.g., in sortation of items 201 according to city, region or country of the respective destination locations of the items 201. Accordingly, each discharge station 205 represents a city, region or country, and a plurality of items 201

is collected at each discharge station. In addition, special discharge stations 205, e.g., for special items, such as fragile items, may be provided.

From the discharge stations 205, the items are transported by a transport means, such as a truck 220, to a second item processing installation, such as a second mail center 203. The second mail center 203 may, e.g., be a regional post office. In the example shown, the second mail center 203 comprises a second control system which comprises a second computer system 208. As indicated by flash arrow 416, the second computer system is operationally connected to the first computer system 207.

At the second mail center 203, the items 201 are automatically sorted and distributed to a number of discharge stations as indicated by arrows at 206. Preferably, sorting of items 201 at the second mail center 203 is carried automatically and is controlled by the second computer system 208 which is operationally connected to the discharge stations 206, as indicated by flash arrow 415. At the discharge stations 206, the items 201 are sorted, e.g., according to cities, streets, companies or other appropriate sortation data. From the discharge stations 206, the items 201 are transported by a transporting means, such as, e.g., a truck 220, to the destination location 300.

In the example shown in Fig. 14, accounting means for automatically billing or invoicing carriage costs is provided. The accounting means comprise a tracking and invoicing computer system 209 operationally connected to the first and the second computer systems 207 and 208, respectively, as indicated by flash arrows 407 and 411. Invoicing data or invoicing factors, such as weight and/or volume of items 201 and/or travelling distance of items are passed from the first and/or the second computer systems 207 and 208, respectively.

When an item or a plurality of items has/have been delivered at a destination location or at a number of destination locations, delivery information is passed from a delivery means, such as delivery person 214 to the tracking and invoicing computer system 209, as indicated by flash arrow 412. The delivery information comprises a table of item identification information together and corresponding delivery addresses. In most case, the delivery address is identical to the address of the destination location. However, if an error has occurred during the processing of an item 201, the delivery address of an item 201 may be different from the address of the destination location.

- The computer systems 209, 210 and 211 may, e.g., be located at an item distributing entity. When an item has been delivered at a destination 300 and corresponding information has been passed to the tracking and invoicing computer system 209, information is passed from the computer system 209 to a billing or invoicing means or entity 215. As indicated by flash arrow 417, an invoice is electronically passed or sent to a debtor or a debtor entity which, in the example shown, has his address or place of business at the departure location 200.
- 10 A sequence generating computer system 210 is adapted to generate sortation and/or distributing sequences or sortation patterns for items. Thus, the sender of an item, or a distributing entity, may generate the sortation and/or distributing sequences for a plurality of items. Such sequences are passed from the sequence generating computer system 210 to the first and second computer systems, respectively, as indicated by
- 15 flash arrows 406 and 410. The sequence generating computer system 210 is operationally connected to the distributing entity's computer system, as indicated by flash arrow 408.

- Fig. 1 illustrates subsystems and databases comprised in a system according to the invention, e.g., a system as illustrated in Fig. 14. The system comprises an OCR and/or VC subsystem 51 for OCR and/or VC capturing of an address block provided on a postal item. The system further comprises a first sortation subsystem 52 and second sortation subsystem 53. Five database systems are provided and will be explained in further detail below: a PIB (Postal installation Inhouse dataBase) database
- 25 54, a receiving database 55, a trace and track database 56, a sortation pattern database 57, and a sortation database 58. The PIB database 54, the receiving database 55, the trace and track database 56 and the sortation database 57 are database systems pre-installed at the item processing installation. Interfaces A, B, C, D, F, G, H and I are provided for exchange of information between the databases and
- 30 the subsystems. For the sake of clarity, the following interfaces are not shown in Fig. 1: interfaces between the OCR and/or VC subsystem 51 and the pre-installed databases 54, 55, 56, 57, interfaces for communication between the first sortation subsystem 52 and the second sortation subsystem 53, and interfaces for

communication between first and second sortation subsystems provided at different item processing installations.

The system shown in the drawings is capable of capturing comprehensive amounts of data. Thus, in a relative short time, the entire or almost the entire destination of an item may be captured, and a unique identification code may be associated to the item. The unique identification code is stored at a database electronically connected to the control system of the combined OCR and VC system and is associated to the item by looking up the information captured by the OCR and VC system in a table containing unique identification codes as well as destination addresses. In case the address or destination information captured by the OCR and VC system is not found in the database, an identification code according to at least a part of the destination information (e.g. country and/or city information) is associated to the item, and the item will be further processed using a further system which may be manual or automatic.

The PIB (Postal installation Inhouse dataBase) database 54 is adapted to receive item information, such as item identification information and destination address data, from a plurality of departure locations. Other information concerning the items, such as information related to the content of a parcel, may be sent from a sending entity to the PIB database 54. It is preferred that only sending entities, such as companies, sending a large number of items, may submit data to the PIB database 54.

The receiving database 55 comprises the second address data, i.e. address data of a large number of item receiving persons or entities, i.e. address data of a large number of destination locations. Each destination location corresponds to a database entry in the receiving database 55 and comprises a unique address identification code, such as, e.g. a 10-digit number. The database entries further comprise alternative spellings of street names, location names, city names and/or country names which is used, e.g., for automatic spelling check of address data provided on items and captured by the OCR/VC system 51 or entered manually. Destination locations of private people are preferably identified by zip-code, street name, street number and optionally street letter. Via interface B, data from the receiving database 55 are passed to the sortation database 58.

The trace and track database 56 contains information concerning any item that has been registered in connection with sortation at the first or second sortation subsystem 52 and 53, respectively. Via interface D, the trace and track database 56 receives
5 information concerning any registered item.

The a sortation pattern database 57 contains a plurality of sortation patterns or sortation sequences. Different sortation patterns or sortation sequences for different second mail centres 203 may be stored at the sortation pattern database 57. The
10 database 57 is preferably updated at regular intervals, such as once per day. The sortation pattern may comprise a table for converting unique address identifications codes to a district number which may be used for looking up addresses or other data in further sorting tables. The sortation patterns are updated via interface C, and through interface C, a sortation pattern may be selected.

15

The sortation database 58 is an independent database system which, via database B, may receive information from the receiving database 55. The sortation database is capable of associating a unique address identification code to an item. The sortation database 58 further serves as a host computer system in connection with manual
20 entry of data at the first and second sortation subsystems 52 and 53, respectively. Via interface H, the unique address identification code may be passed to the control system of the first and second sortation subsystems 52 and 53. Street names are downloaded via interface I.

25 The sortation database 58 further comprises a database unit adapted to convert item identification codes to unique address identification codes. The database unit may receive information from further mail processing installations or mail centres or, via interface F, receive information from the OCR/VC system. The control systems of the first and second sortation subsystems 52 and 53 may pass item identification code to
30 the database unit 58 through interface G, and in response receive, through interface G, corresponding unique address identification codes.

The system shown in the drawings may comprise two first sortation subsystems 52 which are automatic and controlled by a control system. The second sortation

subsystem 53 is at least partly manual and is controlled by a control system. The control systems of the first and of the second sortation subsystems are connected to the databases described above. The databases and the control systems are comprised in the one or more first control systems of the first item processing installation.

5

Through interface A, the sortation database 58 receives information concerning IT-items, i.e. items which have been provided with item identification codes before the items have reached the mail processing installation, registered at the PIB database 54 through interface A. Through interface B, the version of the receiving database 55
10 stored in the sortation database 58 is updated. It is possible, through interface B, to transmit all and any data from the receiving and address databases, and it is further possible to transmit modifications to the receiving database 55.

Any time an item is registered in connection with sortation at the sortation
15 subsystems 52 and 53, the trace and track database 56 receives sortation pattern or sortation sequence data 58 through interface D. The sortation database 58 is updated through interface F.

Through interface H, the control systems of the first and second sortation subsystems
20 52 and 53 may receive zip code and other address information which has manually been entered. The following information is passed from the first and second sortation subsystems 52 and 53 to the sortation database 58: zip code, street name, location or city name, street number and street letter. The sortation database 58 responds in passing address information, such as the unique address identification code to the
25 control systems of the first or second sortation subsystems 52 and 52. In case the sortation database 58 is not capable of finding the needed address information, an error code indicating that the address is not known is passed to the control systems of the first or second sortation subsystems. In case a plurality of companies have been found on the requested address, a list of possible companies is passed to the control
30 systems of the first or second sortation subsystems.

Data and street names per zip code are passed through interface I in order to carry out a local encoding or local data entry procedure.

Preferably, all information through the interfaces is carried out as file transfer using FTP file transfer.

In the following, an estimate of typical amounts of data being transferred through the
5 interfaces will be given together with an estimate of typical processing times of
transmitting data through the interfaces. The numbers given below are examples of
possible/typical values.

Per day information concerning approximately 80000 IT-items may be passed per day.
10 Thus, approximately 80000 database records are transferred. A file being transferred
may contain between 1000 and 10000 records, and the processing or transmitting
time per file will be between 3 and 23 minutes.

Approximately two times per year address data is passed to the sortation database 58
15 through interface B. Excessive amounts of data are being passed, and therefore data
are to be transferred when no processing of items is being carried out. Approximately
3000000 records are to be transferred, and the processing or transmitting time is
approximately 6-10 hours, such as 8.5 hours due to the fact that the excessive
amounts of data are to read and written from/to a hard disk or another storage means.

20 Approximately two times per year, data from the receiving database 55 are transferred
through interface B. Approximately 700000 to 1000000 records are being transferred,
corresponding to 50-100 MB. The time of processing or transmitting is approximately
1-5 hours, such as 2.5 to 3 hours, and therefore data are to be transferred when no
25 processing of items is being carried out. Following transferring of data, data are to be
processed for another approximately 1.5 hours, e.g., at the control systems of the
sortation subsystems.

Modified records are normally transferred from the receiving database 55 on a daily
30 basis. Approximately 4000 records, i.e. 4000 deleted records and 4000 inserted
records, are transferred, and the processing or transmitting time is approximately 7
minutes followed by further processing, such as processing at the control systems of
the sortation subsystems 52 and 53.

Data related to country codes are transferred through interface B on a weekly basis. Approximately 500 records are to be transferred, and the processing time is normally less than 3 minutes followed by further processing, such as processing at the control systems of the sortation subsystems 52 and 53.

5

Through interface C, sortation patterns or sortation sequences are transferred once per month. At the same time, a sequence file is being transferred. The file containing sortation pattern information has approximately 300 records, and processing of the file lasts for approximately 7 minutes. The sequence file contains approximately
10 6000000 records, corresponding to approximately 180 MB, and processing of the file will last approximately 17 hours. Therefore data are to be transferred when no processing of items is being carried out.

When the sortation database 58 has received and processed data from the receiving
15 database 55, a file containing all street names belonging covered by any and all zip codes is created. This file is transferred to the control systems of the first and second sortation subsystems 52 and 53 through interface I. The file contains approximately 300000-400000 records, and the processing time at the control systems of the sortation subsystems is approximately 1,5 hours. Through interface I, new or modified
20 country codes are transferred to the control systems of the sortation subsystems which lasts approximately 3 minutes.

Processing and/or transferring times may be reduced by:

- transferring only selected data records instead of complete sets of data records,
- 25 - transmitting files well before they are needed at the respective receiving systems and processing data whenever there is processing capacity available,
- utilising a separate server for generating the necessary databases and subsequently transferring the data to the respective databases/computer systems.

30

Fig. 2 is a diagrammatic illustration of computer systems and databases comprised in a preferred embodiment of a system according to the invention. The sortation database comprises two systems: the sortation database itself 58a and the database unit 58b. The control systems of the first sortation subsystem comprises two

computer systems 61 and 62, and the control systems of the second sortation subsystem comprises two computer systems 63, 64. The computer systems 61, 62, 63 and 64 may themselves represent control systems of sortation subsystems, in which case two first and two second sortation subsystems are provided. Two
5 operating terminals 65 and 66 are provided. The computer and database systems shown in Fig. 2 are linked through ethernet connections 71, 72 and 73.

Fig. 3 is a diagrammatic illustration of the sortation database 58a and an associated computer system. The database itself is labelled 80, whereas operations being carried
10 during processing of data are illustrated by means of rectangular boxes labelled 81, 82, 83 and 84. Processing which is being carried out when no items are being processed is indicated by a box 86. Data are received from the receiving database 55, processed at 82 and passed to the database 80. At 84, zip codes and street names are downloaded to the computer systems 61, 62, 63, 64 of the control systems of
15 the first and second sortation subsystems. At 83, data are requests for data from the computer systems 61, 62, 63, 64 are received, and responds are passed to those computer systems. At 81, data from the PIB database are received, and addresses are converted to unique address identification codes and passed to the database unit 58b.

20 Fig. 4 is a diagrammatic illustration of the interfaces to and from the sortation database 58. The above description in connection with Fig. 1 applies to Fig. 4.

Fig. 5 is a diagrammatic illustration of the interfaces to the sortation database unit 58b. The above description in connection with Fig. 1 applies to Fig. 5. Preferably, the
25 database unit 58b may be exchanged by a backup unit (not shown).

Fig. 6 is a diagrammatic illustration of an automatic sortation system. The system of Fig. 6 is appropriate to items for which an identification code and a unique address identification code has been associated. Such items may be items which have
30 successfully been OCR- or VC-processed, as indicated by arrow 51p, items coming from another mail processing installation, as indicated by arrow 203p or IT-items, as indicated by arrow 54p. The item identification code and the unique address identification code is known and processed by an automatic processing database 87

which is preferably comprised in the database unit 58b. Sortation of items is carried out as follows:

1. An item is fed onto the sorting conveyor 204, cf. Fig. 14, while a feeding system for feeding items onto the sorting conveyor is in automatic mode, i.e. no manual entry of address data is carried out.
 2. The optically readable item identification code is captured by a scanner.
 3. The control system of the sortation subsystem or the sorting conveyor 204 passes a converting request to the database unit 58b which converts the item identification code to a corresponding unique address identification code.
 - 10 Converting is performed on the basis of data previously passed to the database unit 58b.
 4. The discharge station 205 at which a given item is to be discharge is determined by means of the sortation pattern and primary and/or secondary sorting tables.
- If the unique address identification code corresponds to a post box, the sortation pattern is not used. In such case, the unique address identification code is used directly with the sorting tables.

When the scanner has captured the item identification code, the sortation tables are used as illustrated in Fig. 7. The item identification code is passed from the control system 61, 62 of the sorting conveyor 204 to the database unit 58b, as indicated by arrow 88. The unique address identification code is passed from the database unit 58b to the control system 61, 62 of the sorting conveyor 204 as indicated by arrow 89. The unique address identification code is looked up in the sorting tables 90, and discharged at discharge stations 205 in accordance with sortation pattern tables 91.

25 The sortation pattern table 91 stores any and all unique address identification codes which, according to the example given above, comprises approximately 3000000 records. However, this number may be reduces by using only one unique address identification code for a plurality of address, such as, e.g., a number of apartments located in the same apartment block.

30

Fig. 8 is a flow sheet illustration the information flow in the system in connection with items which have been scanned by the OCR/VC-system. Due to an error or unforeseen circumstances, it may happen that the item identification code and the associated unique address identification code has been recorded in the database unit 58b when

the corresponding item is fed onto the sorting conveyor. Therefore, conversion of codes must be repeated, when data from the OCR/VC-system 51 arrive. At 95 it is determined whether the item identification code has been scanned. If this is the case a discharge station is associated to the item in question, as indicated by arrow 93 and
5 process box 94. If the item identification has not been scanned, a signal indicating this fact is passed to the database 58b, as indicated by arrow 92.

Fig. 9 is a flow sheet illustration an encoding procedure for items which are being manually encoded. At 101, the zip code is entered down to the most specific level
10 possible. At 102, street name or post box is entered until the street name or post box is complete defined within the zip code entered at 101. In case the entered street name occurs more than once within the zip code entered, an operator is prompted for entering further address data. At 103, house or street number is entered. Steps 101, 102 and 103 marked by box 100 are related to the control systems of the sortation
15 subsystems only. When step 103 has been completed, the data entered are passed to the sortation database 58, as indicated by arrow 104. The sortation database passes information from the receiving database 55, as indicated by arrow 105, the information comprising also an indication of whether the destination location is a corporate location. If this destination location is a corporate location, a list of possible
20 companies is passed from the sortation database, and the operator may choose the correct company from the list.

At 106, it is determined whether the address identification information passed from the sortation database is unique. If this is not the case, the process is continued at
25 109, arrow 107 indicating that the address identification information is not unique. If the address identification information passed from the sortation database is unique, the procedure is ended at 115, as indicated by arrow 108, box 115 indicating that a unique address identification number has been determined. At 109, it is determined whether a company is located at the non-unique destination address. If yes, the
30 process is continued at 122, as indicated by arrow 110, the company name being chosen by the operator at 112. If no, the process is continued at 116, as indicated by arrow 111. At 116, an identification for the house or street number is entered so as to determine a unique address identification number which is passed to or from 115 as indicated by arrow 114.

Fig. 10 is a diagrammatic illustration of interface H shown in Fig. 1 illustrating the information flow along arrows 104 and 105 in Fig. 9.

- 5 Fig. 11 is a flow sheet illustration of a first sortation table system. Address information is passed into the system as indicated by arrow 121. The information is passed to a memo table 122 from which a district identification code is determined. The district code is preferably a 10-digit number. The district code is passed to a primary sortation table from which a destination and/or a discharge station is
- 10 determined, if possible. If a destination and/or discharge station is determined, the process is continued at 125 where further, optional processing is carried out, and the destination and/or discharge station identification is passed further on as indicated by arrow 126. If a destination and/or discharge station is not determined, the district code is processed at 125 in a secondary sortation table in order to determine a
- 15 destination and/or discharge station, and the process is continued at 125 as described above. The resulting destination and/or discharge station identification comprises zip code and an address identification number.

- Fig. 12 is a flow sheet illustration of a second sortation table system which in addition
- 20 to the steps indicated in Fig. 11 and described above, comprises determining a sortation pattern code at 127. The resulting destination and/or discharge station identification at 126 comprises group information, distributing route information and sortation pattern information.

- 25 Fig. 13 is diagrammatic illustration of information flow between the second sortation subsystem and the database unit 58b. When the scanner has captured the item identification code, the sortation tables are used as illustrated in Fig. 13. The item identification code is passed from the control system 63, 64 of the second sortation subsystem comprised in the sorting conveyor 204 to the database unit 58b, as
- 30 indicated by arrow 88. The unique address identification code is passed from the database unit 58b to the control system 63, 64 of the sorting conveyor 204 as indicated by arrow 128.

Fig. 14 which has been described in detail above is an overall illustration of a preferred embodiment of a system according to the invention.

The first and second sortation subsystems may comprise any kind of manual or automatic sortation systems. Typically, the first sortation subsystem is a full automatic sortation system controlled by a control system which communicates with the databases as described above. The first sortation subsystem is typically suited for "normal" items, i.e. items having a weight and dimensions within predetermined ranges and/or items which have successfully been scanned by the OCR_VC-system 51. The second sortation subsystem is typically suited for items having a weight and/or dimensions beyond the predetermined ranges and/or items which have not been successfully scanned by the OCR_VC-system 51. The sortation subsystems may comprise further equipment, such as hand scanning devices or other scanners, weights, communication devices such as modems, and printers.

CLAIMS

1. A method for processing postal items, each item being sent from a departure location to a destination location, the method comprising:

5

(a) delivering items to an item receiving part of a first item processing installation, the first installation being adapted to collect and process items from a plurality of departure locations and comprising one or more first control systems for controlling the processing of items,

10

(b) conveying each item along a first system for capturing a first address signal from address identification means optionally provided on the items,

(c) processing the first address signal to derive first address data,

15

(d) passing the first address data to a first computer system comprised in the at least one first control system,

(d_{ii}) processing the first address data of an item in order to determine whether or not it is sufficient in order to automatically sort and distribute the item in question, and

20

- if the first address data is sufficient: going to step (e),
- if the first address data is insufficient: going to step (f),

(e) comparing the first address data to second address data previously stored in a first database comprised in or connected to the first computer system, and

25

- if the first address data of an item is identical or nearly identical to an entry of second address data in the first database: associating a unique address identification code the item in question and going to step (g),
- if the first address data of an item is not identical or nearly identical to any entry of second address data in the first database: associating an error code to the item in question and going to step (g) or transporting the item in question to further manual or automatic processing thereof,

30

(f) conveying the items along a second system for capturing a second address signal from the address identification means or for further processing the first address signal, and

- 5 - processing the first or the second address signal to derive third address data,
- ensuring by automatic or manual means that the third address data is sufficient in order to automatically sort and distribute the item in question,
- 10 - storing the third address data as the first address data and going to step (e),

(g) conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by the first computer system,

(h) discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the unique address identification code or according to the error code,

(j) optionally transporting the items for further processing thereof or delivery thereof at the respective destinations,

25 the method being applicable postal items of various sizes.

2. A method according to claim 1, wherein step (b) comprises optically capturing a first image of a printed or written address block optionally provided on the items.

30

3. A method according to claim 1, wherein step (b) comprises capturing first address signal by means of a radio signal received from radio transmission means comprised in the address identification means.

4. A method according to claim 2 or 3, wherein step (f) comprises optically capturing a second image of a printed or written address block optionally provided on the items.

5. A method according to any of claims 1-4, wherein the first address signal is being captured while the item in question is being conveyed along the sorting conveyor.

6. A method according to any of claims 1-5, wherein the second address signal is being captured while the item in question is being conveyed along the sorting conveyor.

10

7. A method according to any of claims 4-6, wherein the step of further processing the first image at step (f) is being carried out by means of a video coding system.

8. A method according to any of claims 1-7, wherein the second address signal is being captured by a human, the information provided by the second address signal being passed to the first computer system by manually entering the information.

9. A method according to any of claims 1-8, wherein the further processing of the first address signal at step (f) is being carried out by a human, the information thereby derived from the first address signal being passed to the first computer system by manually entering the information.

25

10. A method according to any of claims 1-9, wherein step (e) further comprises performing spelling checking at least part of the first address data.

11. A method for processing postal items, each item being sent from a departure location to a destination location, the method comprising:

(a) providing an item with an identification code in a standard format at the departure location, the identification code corresponding to a unique address identification code stored at a storage means comprised in a computer system comprised in or connected to a first control system comprised in a first item processing installation,

(b) delivering items to an item receiving part of the first installation, the first installation being adapted to collect and process items from a plurality of departure locations and comprising one or more first control systems for controlling the processing of items,

5

(c) passing the identification code together with a destination code of the item from the departure location to at least one of the one or more first control systems, the destination code identifying the address of the destination location of the item,

10 (d) storing the destination code in the storage means and processing the destination code so as to associate the destination code to the corresponding unique address identification code,

(e) capturing the identification code at the item processing installation by means of a
15 code capturing device adapted to pass the identification code to at least one of the one or more first control systems,

(f) processing the identification code so as to associate the corresponding unique address identification code to the item,

20

(g) conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by a first computer system comprised in the one or more first control systems,

25

(h) discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the identification code associated to the item in question,

30 (j) optionally transporting the items for further processing thereof or delivery thereof at the respective destinations.

12. A method according to claim 11, wherein the identification code is optically readable, and wherein step (e) comprises scanning the identification code by means of a code scanning device.
- 5 13. A method according to claim 11 or 12, further comprising, prior to or during step (e), the step of determining whether the identification code is present on the item and in such case whether it is readable by the code scanning device.
14. A method according to any of claims 11-13, wherein a further identification code
10 is provided in or on all or some of the items for further identifying the item(s).
15. A method according to claim 14, wherein the identification code and the further identification code at least comprise a bar code.
- 15 16. A method according to claim 14 or 15, wherein the identification code and the further identification code at least comprise a radio frequency tag.
17. A method according to any of claims 11-16, further comprising the step of
20 processing the item in question by a method according to any of claims 1-10 in case step (e) or (f) of claim 11 fails or in case the identification code is not present or uncaptureable, the first item processing installation of claims 1-10 being the first item processing installation of any of claims 11-16.
18. A method according to any of claims 11-17, wherein the identification code is
25 being captured while the item in question is being conveyed along the sorting conveyor.
19. A method according to any of claims 1-10 or any of claims 1-18, further comprising the step of weighing at least some of the items being processed at the first
30 installation.
20. A method according to any of claims 1-10 or any of claims 11-19, further comprising the step of automatically measuring or scanning the volume of at least

some of the items being processed at the first installation, the measuring or scanning being performed by means of a volume scanning system.

21. A method according to claim 20, wherein the measuring or scanning is performed
5 on the sorting conveyor while the item in question is being conveyed along the sorting conveyor.

22. A method according to any of claims 1-10 or any of claims 11-21, further comprising the step of passing weight information representing the weight of the item
10 in question to a computer system comprised in the at least one first control system.

23. A method according to any of claims 20-22, further comprising the step of passing volume information representing the volume of the item in question to a computer system comprised in the at least one first control system.

15

24. A method according to any of claims 1-10 or any of claims 11-23, further comprising, subsequent to step (j) of claims 1 and 11, respectively, transporting a plurality of items from the first installation to a second item processing installation, the second item processing installation being adapted to further process the items.

20

25. A method according to any of claims 1-10 or any of claims 11-24, wherein the unique address identification code represents one or more of the following particulars of the destination location: city or local district, street name, street number, country.

25 26. A method according to claim 25, wherein the unique address identification code further represents the name of the addressee.

27. A method according to any of claims 25 or 26 as dependent on claim 11, further comprising, subsequent to step (c) of claim 11, comparing the destination code and/or
30 the unique address identification code to second address data previously stored in a first database comprised in or connected to the one or more first control systems in order to verify the destination location of an item.

28. A method according to any of claims 1-10 or claim 27, wherein the one or more first control systems comprised in the first installation are connected to an exterior database in which names and address of a large number of persons is stored, the first control system or the exterior database comprising or being connected to a database
5 comprising non-modified second address data and modified second address data, the method further comprising:

- automatically associating the unique address identification code corresponding to the modified second address data to an item in case the first address data or the destination code correspond to the non-modified second address data.

10

29. A method according to any of claims 1-10 or any of claims 11-28, wherein the postal items comprise envelopes.

30. A method according to any of claims 1-10 or any of claims 11-28, wherein the
15 postal items comprise parcels and/or packets.

31. A method according to any of claims 1-10 or any of claims 11-30, the method further comprising, prior to step (g) of claim 1 or claim 11, bypassing all or some of steps (b)-(j) in case the weight and/or the dimensions of a postal item exceeds
20 previously determined limits.

32. A method according to any of claims 1-10 or any of claims 11-31, further comprising, subsequent to step (j), transporting at least some of the items to a second item processing installation for further processing of the items.

25

33. A method according to claim 32, wherein the second item processing installation comprises a second control system for controlling processing of items, the second control system being connected to the one or more first control systems, the method further comprising, subsequent to step (e) or (f) of claim 1 or subsequent to step (c) of
30 claim 11:

- (I) passing destination information, such as the unique address identification code, together with item identification data from the first control system to the second control system, and
- (II) providing each item with an optically readable item identification code.

34. A method according to claim 33, further comprising capturing the optically readable item identification code at the second item processing installation and deriving therefrom the corresponding item identification data and destination information and sorting items according to the respective destination information.
35. A method according to any of claims 1-10 or any of claims 11-34, further comprising passing a table comprising item identification information and destination information associated to a plurality of items from the one or more first controls systems to the second control system or from the second control system to a third control system comprised in a third item processing installation optionally provided.
36. A method according to claim 35, comprising, at the second or the third control system, processing the destination information associated to each item, so as to derive the address of the destination location from the destination information.
37. A method according to claim 35 or 36, further comprising printing the table and/or a list of addresses of destination locations of items and delivering the items associated to the item identification information listed or stored in the table at the respective destination locations of the items.
38. A method according to claim 35, further comprising automatically delivering the items associated to the item identification information listed or stored in the table at the respective destination locations of the items.
39. A method according to any of claims 33-38, wherein a plurality of second item processing installations are provided, step (I) of claim 33 comprising passing the destination information together with item identification data from the first control system to the respective second control systems in accordance with the destination information, whereby destination information and item identification information associated to an item being transported to a certain second item processing installation is being passed to that second item processing installation.

40. A method according to any of claims 1-10 or any of claims 11-39, wherein the step of capturing the first image of a printed or written address block provided on items and/or the step of scanning the optically readable identification code is carried out by means of an optical character recognition system.

5

41. A method according to claim 40, wherein the optical character recognition system comprises an auto focus system, the step of capturing the first image and/or the step of scanning the identification code comprising auto focusing on a relevant part of the item in question.

10

42. A method according to any of claims 1-10 or any of claims 11-41, further comprising the step of passing data to an item tracking database connected to or comprised in the one or more first control systems, in the second and/or in the third control system when an item has been delivered at a destination location or at other events during the steps of processing an item.

15

43. A method according to any of claims 1-10 or any of claims 11-42, further comprising passing volume and/or weight data from the one or more first control systems to an account database connected to or comprised in an account computer system.

20

44. A method according to claim 42 and 43, wherein the account computer system is connected to or comprised in the item tracking database, the method comprising automatically invoicing carriage costs by:

- 25 - computing the carriage costs in dependency of the weight and/or volume of an item and optionally in dependency of one or more further factors,
- printing an invoice and sending it to a debtor and/or electronically forwarding the invoice to the debtor and/or automatically drawing the debit from an account of the debtor.

30

45. A method according to any of claims 42-44, wherein a plurality of item tracking databases and/or a plurality of account computer systems are provided, the steps of passing data of claims 42-44 comprising passing the data to a selected one of the

plurality of item tacking databases and/or to a selected one of the plurality of account computer systems, respectively.

46. A method according to any of claims 24-45, further comprising:

- 5 - generating a sortation sequence or sortation pattern in the one or more first control systems or in the second control system, the sortation sequence or sortation pattern comprising information as to the sequence of further sortation of a plurality of items.
- 10 47. A method according to claim 46, wherein the sortation sequence or sortation pattern comprises information as to the sequence of further sortation of a plurality of items at the second item processing installation or at other locations, the sortation sequence or pattern being generated in the one or more first control systems, the method comprising passing the sortation sequence or sortation pattern from the one or
- 15 more first control systems to the second control system or to another control system.

48. A method according to any of claims 11-47, further comprising generating sortation data or sortation information for a plurality of items at the departure location prior to step (b) of claim 11 and passing such data or information to the one or more

20 first control systems directly or through a sortation data generating computer system.

49. A method according to claim 48, further comprising passing information from the sortation generating computer system to the account computer system or to the tracking database or passing information from the account computer system or from

25 the tracking database to the sortation generating computer system.

50. A method according to claim 49, wherein a plurality of sortation data generating computer systems are provided, the method comprising passing sortation data from the plurality of sortation data generating computer systems to the one or more first

30 computer systems.

51. A method according to any of claims 42-50, wherein one or more of the item tracking database(s), the account computer system(s), the sortation data generating

computer systems and/or of one or more other systems or database are placed at a location other than the first and the second item processing installation.

52. A system for processing postal items, each item being sent from a departure
5 location to a destination location, the system comprising:

- an item receiving part for receiving items at first item processing installation, the first
installation being adapted to collect and process items from a plurality of departure
locations and comprising one or more first control systems for controlling the
10 processing of items,

- a first system for capturing a first address signal from address identification means
optionally provided on the items,

15 - means for processing the first address signal to derive first address data,

- means for passing the first address data to a first computer system comprised in the
at least one first control system,

20 - processor means for processing the first address data of an item in order to
determine whether or not it is sufficient in order to automatically sort and distribute
the item in question,

- processor means for comparing the first address data to second address data
25 previously stored in a first database comprised in or connected to the first computer
system,
and

- means for associating a unique address identification code to the item in question,
30

- means for an error code to the item in question,

- means for transporting the item in question to further manual or automatic
processing of the item,

- means for conveying the items along a second system for optically capturing a second address signal from the address identification means or for further processing the first address signal, and

5

- processor means for processing the first or the second address signal to derive third address data,

10

- means for ensuring by automatic or manual means that the third address data is sufficient in order to automatically sort and distribute the item in question,

- storage means for storing the third address data as the first address data,

15 - a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by the first computer system,

20 - a plurality of discharge stations arranged along the sorting conveyor, the discharge station being automatically selected by the first computer system according to the unique address identification code or according to the error code,

- optionally means for transporting the items for further processing thereof or delivery thereof at the respective destinations.

25

53. A system according to claim 52, further comprising means for carrying out some or all of the method steps of any of claims 1-10.

54. A system for processing postal items, each item being sent from a departure
30 location to a destination location, the system comprising:

- means for providing an item with an optically readable identification code in a standard format at the departure location, the identification code corresponding to a unique address identification code stored at a first storage means comprised in a

computer system comprised in or connected to a first control system comprised in a first item processing installation,

- delivering means for delivering items to an item receiving part of the first installation,

5 the first installation being adapted to collect and process items from a plurality of departure locations and comprising one or more first control systems for controlling the processing of items,

- means for passing the identification code together with a destination code of the

10 item from the departure location to at least one of the one or more first control systems, the destination code identifying the address of the destination location of the item,

- second storage means for storing the destination code in the first storage means and

15 processing the destination code so as to associate the destination code to the corresponding unique address identification code,

- scanning means for scanning the optically readable identification code at the item processing installation by means of a code scanning device adapted to pass the

20 identification code to at least one of the one or more first control systems,

- processing means for processing the identification code so as to associate the corresponding unique address identification code to the item,

25 - means for conveying each item along a sorting conveyor adapted to sort items, the sorting conveyor comprising a plurality of discharge stations and means for unloading items being conveyed along the sorting conveyor, discharging of items being controlled by a first computer system comprised in the one or more first control systems,

30

- means for discharging each item at a discharge station, the discharge station being automatically selected by the first computer system according to the identification code associated to the item in question,

(j) optionally means for transporting the items for further processing thereof or delivery thereof at the respective destinations.

55. A system according to any of claims 52-54, further comprising means for carrying
5 out some or all of the method steps of any of claims 11-51.

56. A method for processing postal items at a first item processing installation comprising a control system, the method comprising:

10 (a) identifying each item by means of first item identification means operationally connected to the control system and passing a first identification signal from the identification means to the control system,

(b) identifying each item by means of second item identification means operationally
15 connected to the control system and passing a second identification signal from the identification means to the control system,

(c) determining and processing address data optionally provided on or comprised in each item by means of an address identification means and passing an address signal
20 from the address identification means to the control system,

(e) associating the first and second identification signals to the address signal of each item,

25 step (e) being performed in the control system.

57. A method according to claim 56, wherein step (a) and/or step (b) comprises the step of scanning a bar code provided on all or some of the items, the first and/or second item identification means, respectively, comprising one or more bar code
30 scanners.

58. A method according to claim 56 or 57, wherein step (a) and/or step (b) comprises identifying all or some of the items by means of a radio frequency tag optionally comprised in or on each item.

59. A method according to any of claims 56-58, wherein step (a) and (c) occur simultaneously.

5 60. A method according to any of claims 56-59, wherein first item identification means is comprised in the address identification means.

61. A method according to any of claims 56-60, wherein step (b) and (c) occur simultaneously.

10

62. A method according to any of claims 56-61, wherein second item identification means is comprised in the address identification means.

63. A method according to any of claims 56-62, wherein steps (a), (b) and (c) occur
15 simultaneously.

64. A method according to any of claims 56-63, wherein steps (a), (b) and (c) occur while the items are being conveyed along a conveyor system.

20 65. A method according to claim 64, wherein the conveyor system comprises a plurality of conveyor portions moving along the conveyor system, the conveyor system further comprising conveyor portion locating means for determining the respective locations of the conveyor portions in the conveyor system, the method further comprising the steps of:

25

(I) associating a selected conveyor portion to each item,

(II) in case step (a), (b) and (c) do not occur at the same location along the conveyor system:

30

(II.1) carrying out a first one of step (a), (b) and (c) at a first location along the conveyor system,

(II.2) carrying out a second one of step (a), (b) and (c) at a second location along the conveyor system,

(II.3) carrying out a third one of step (a), (b) and (c) at a third location along the conveyor system,

(II.4) tracking each item by means of the conveyor portion locating means while carrying out steps (II.1)-(II.3),

10 so as to, in the control system, associate data representing the first and second identification signals and the address signals of each item to each other.

66. A method according to claim 65, wherein the first location is the second location.

15 67. A method according to claim 65, wherein the first location is the third location.

68. A method according to claim 65, wherein the second location is the third location.

69. A system for automatically processing a plurality of postal items comprising packets and/or parcels, the system comprising one or more of the following features:

- a postal item check-in system,

- a postal item singulating system,

- a system according to claim 45 and/or a system according to claim 47.

70. A method for sorting postal items, the method comprising:

30 (a) conveying the items along a sorting conveyor comprising a plurality of discharge stations and a control system,

(b) discharging each item at a discharge station selected by the control system according to one or more destination particulars of the item,

(c) collecting a plurality of items at a discharge station and rearranging the items at the discharge station according to their destination particular(s), so as to provide for an optimal further transport of the items.

5

71. A method according to claim 70, wherein all or some of the discharge stations each comprise a chute.

72. A method according to claim 71, wherein all or some of the chutes each comprise
10 a pater noster system, the method comprising the step of rearranging and circulating a plurality of items during the process of sorting a plurality of items at the sorting conveyor.

73. A method of processing postal items, comprising the steps of:

- 15 (i) providing each item with an identification code,
(ii) passing the identification code by means of radio frequency transmission to a control system operatively connected to a radio frequency receiver for receiving the identification code,
(iii) processing the postal items in accordance with the identification code.

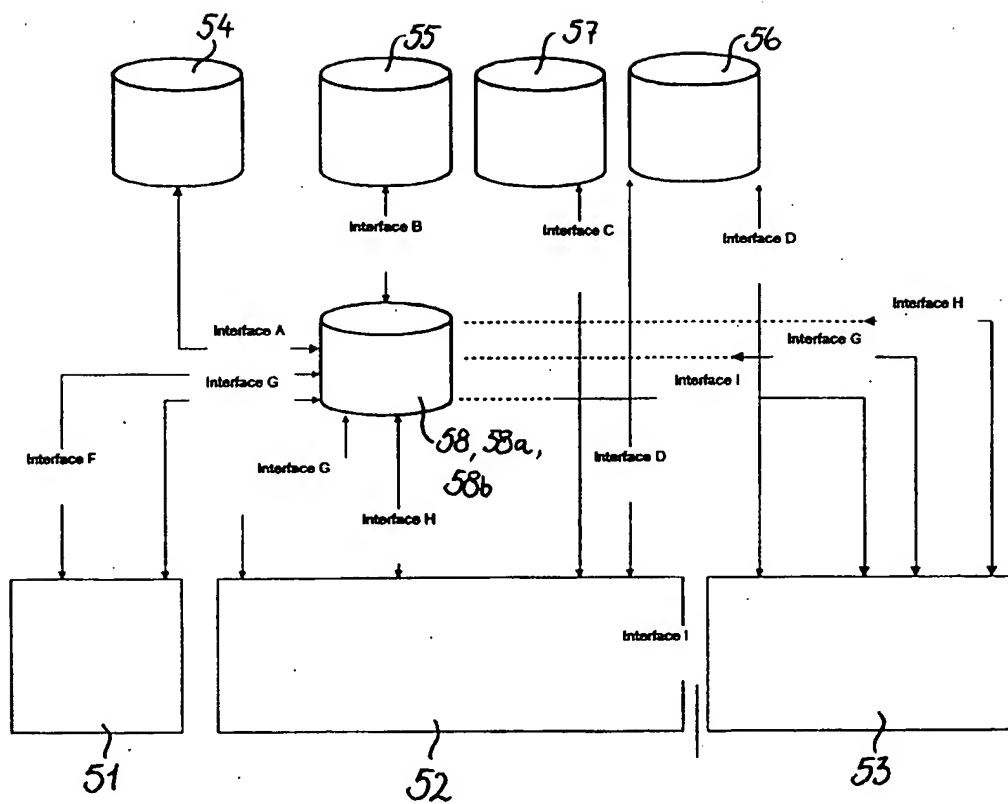
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74. A method according to claim 73, wherein step (iii) comprises sorting items by means of a sorter conveyor.

75. A system for processing postal items, comprising:

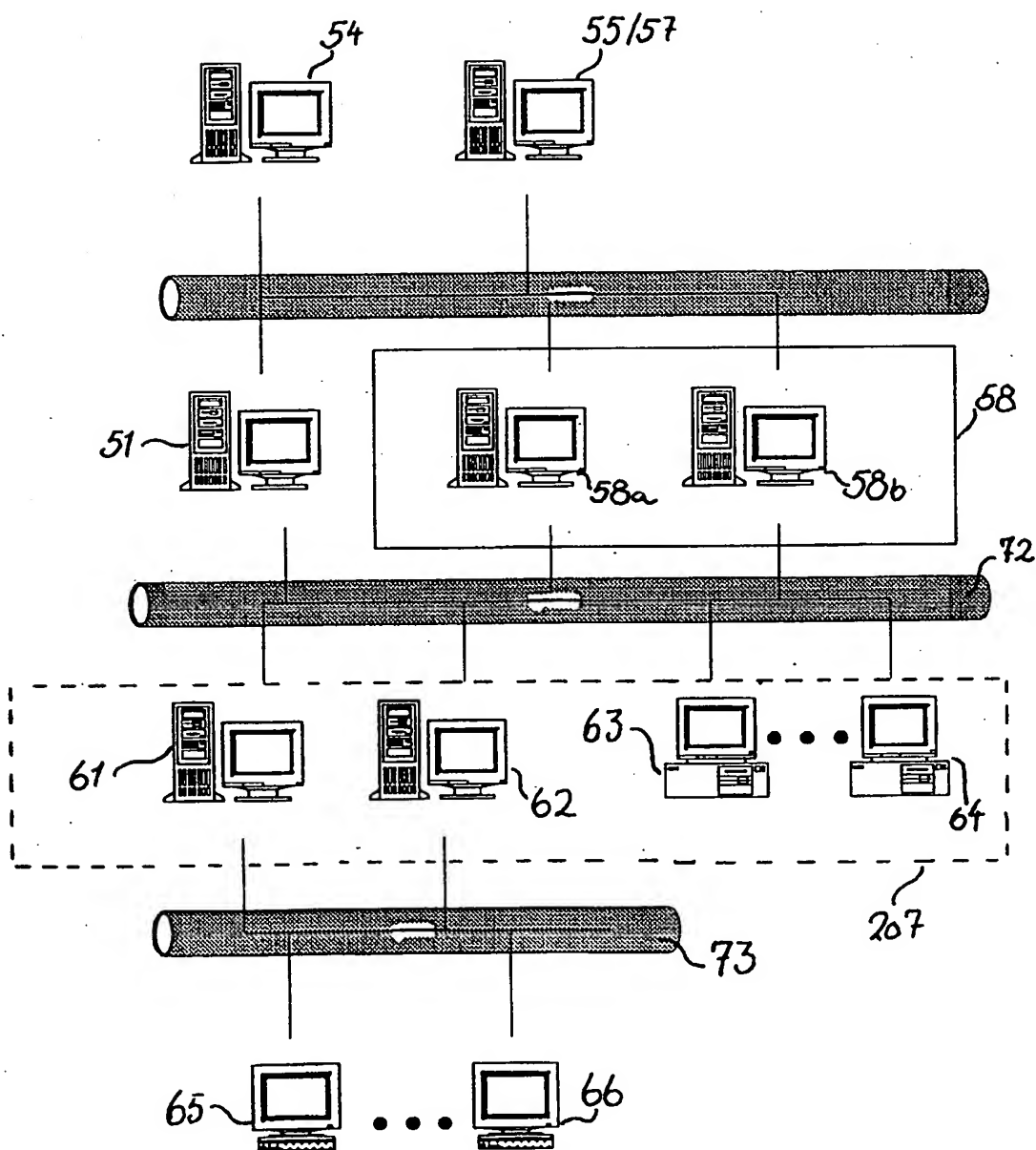
- 25 (i) means for passing an identification code identifying each item to a control system operatively connected to a radio frequency receiver for receiving the identification code,
(ii) means for processing the postal items.

Fig. 1



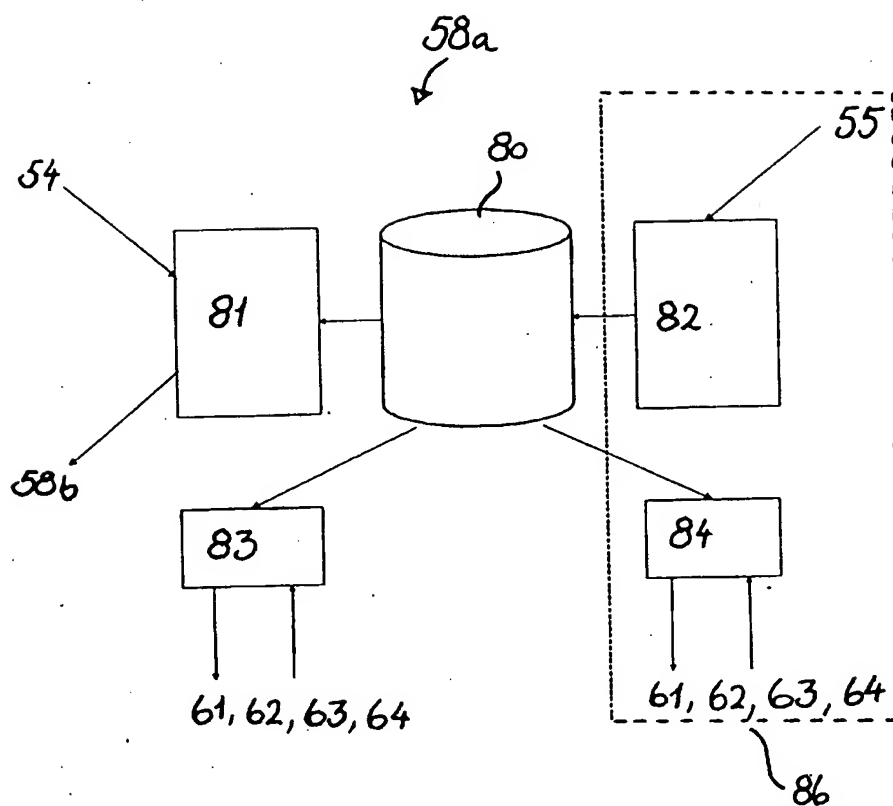
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Fig. 2



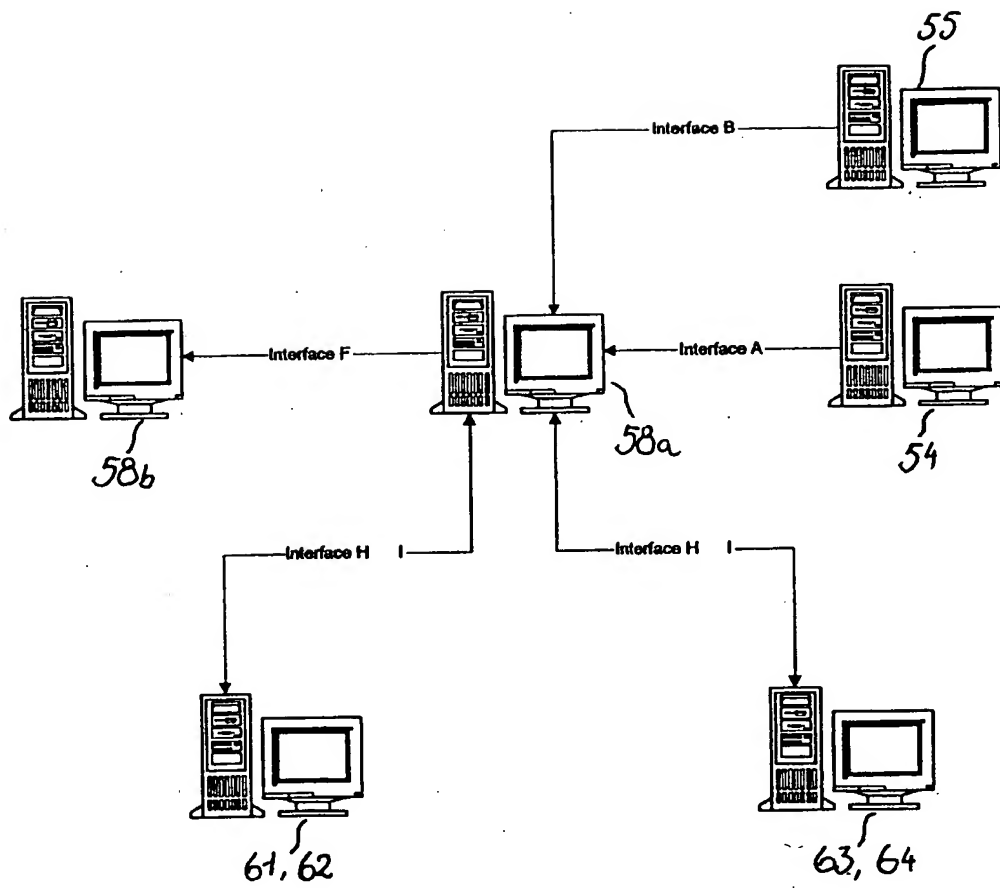
3/11

Fig. 3



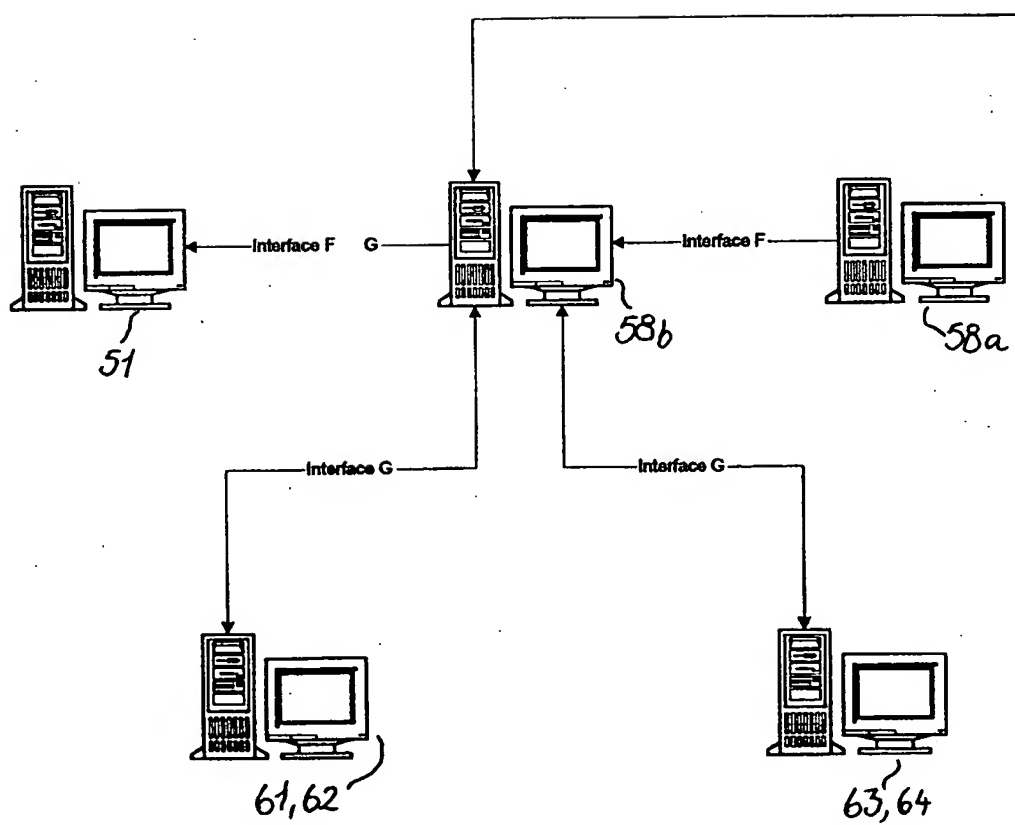
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Fig. 4



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Fig. 5



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Fig. 6

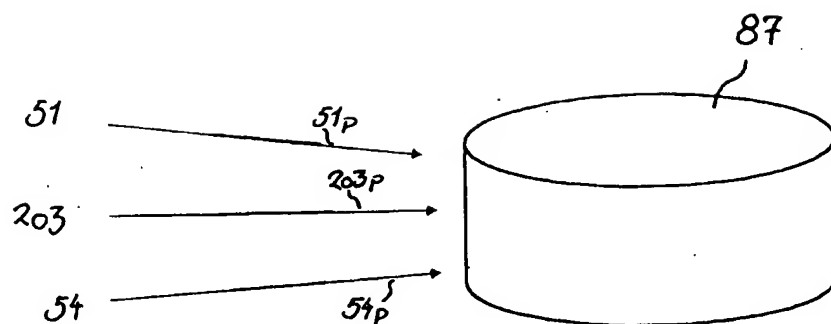
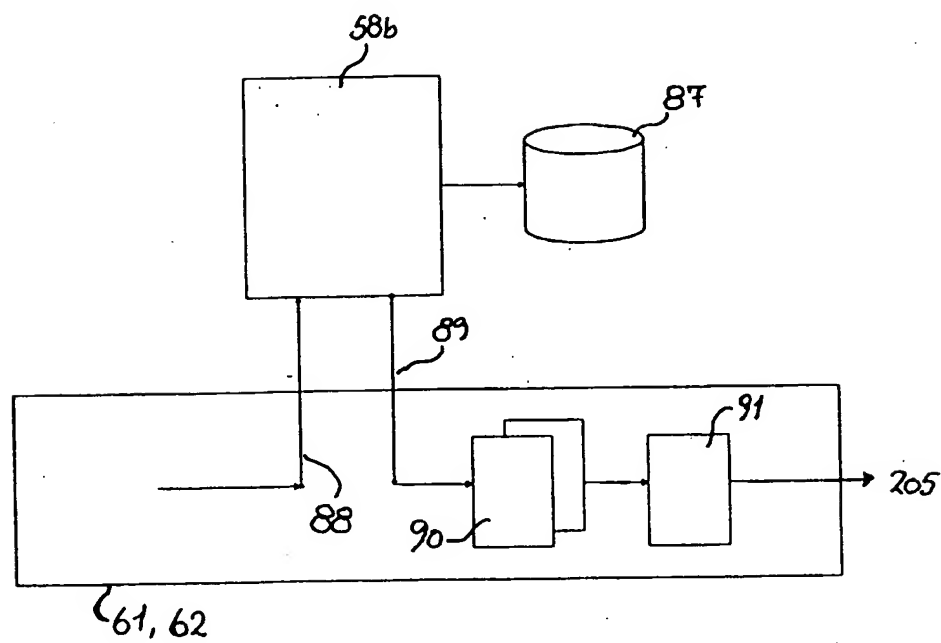
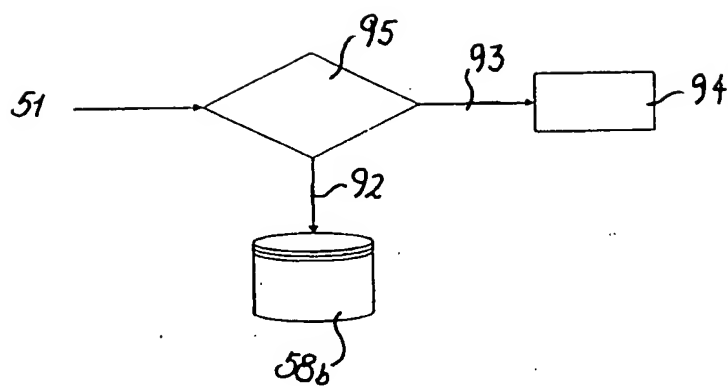


Fig. 7



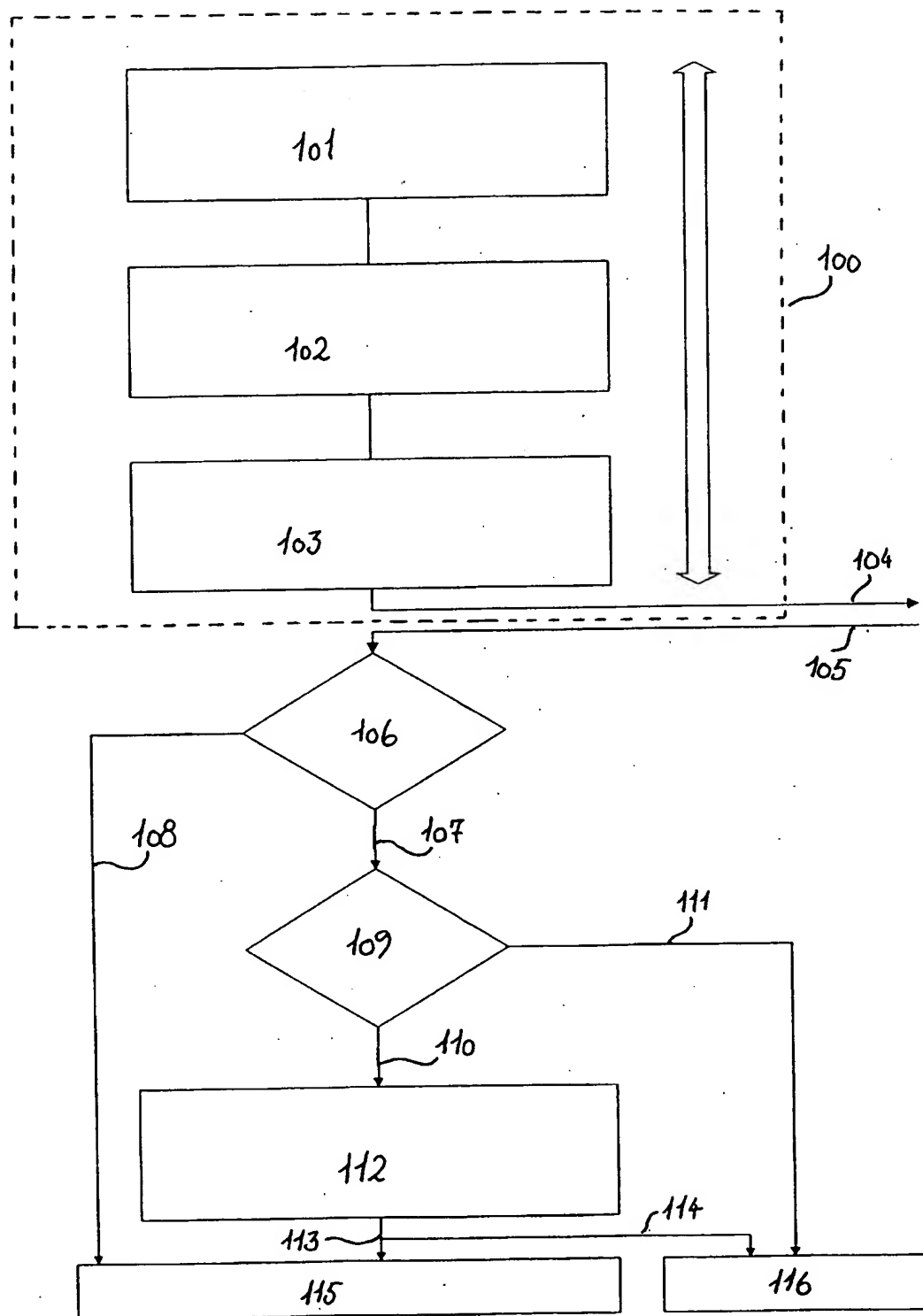
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Fig. 8



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Fig. 9



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Fig. 10

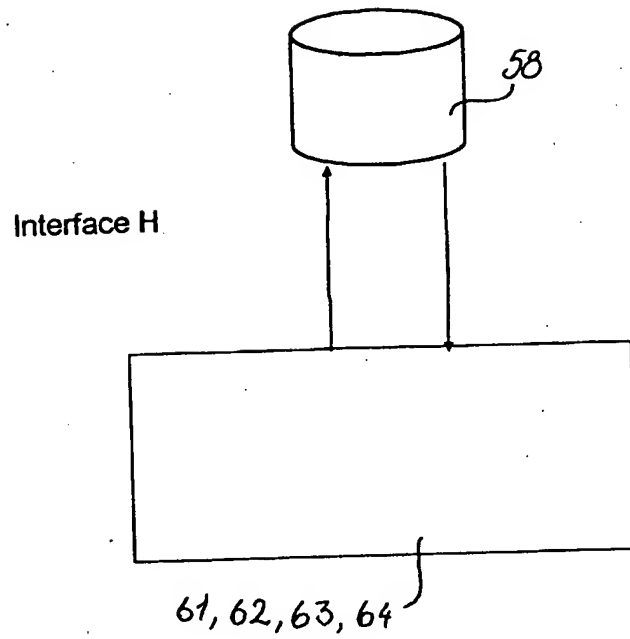
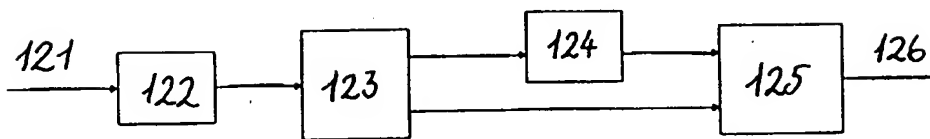
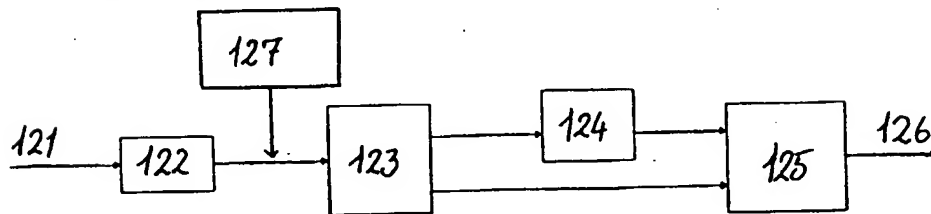
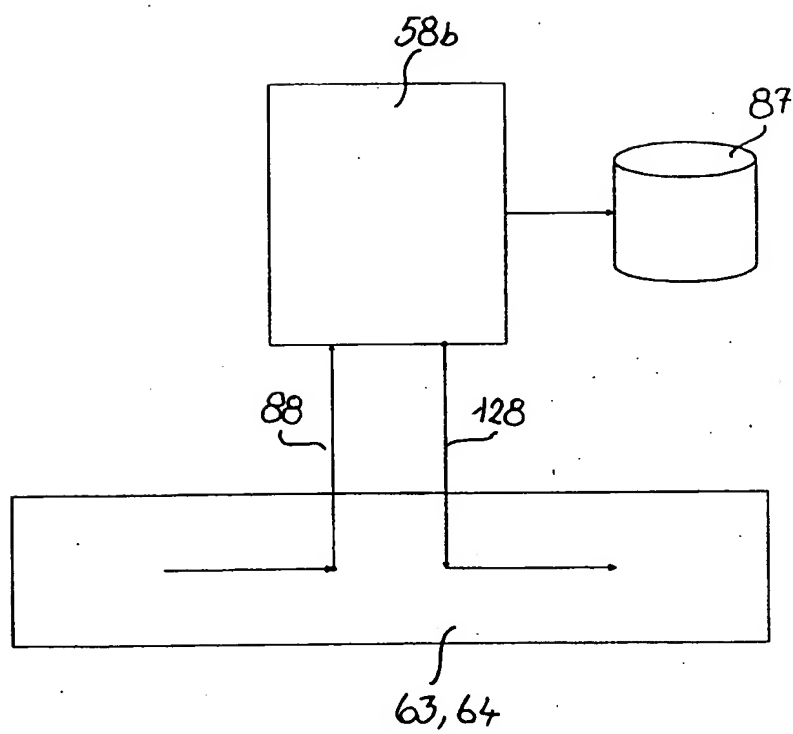
Fig. 11
Prior Art

Fig. 12



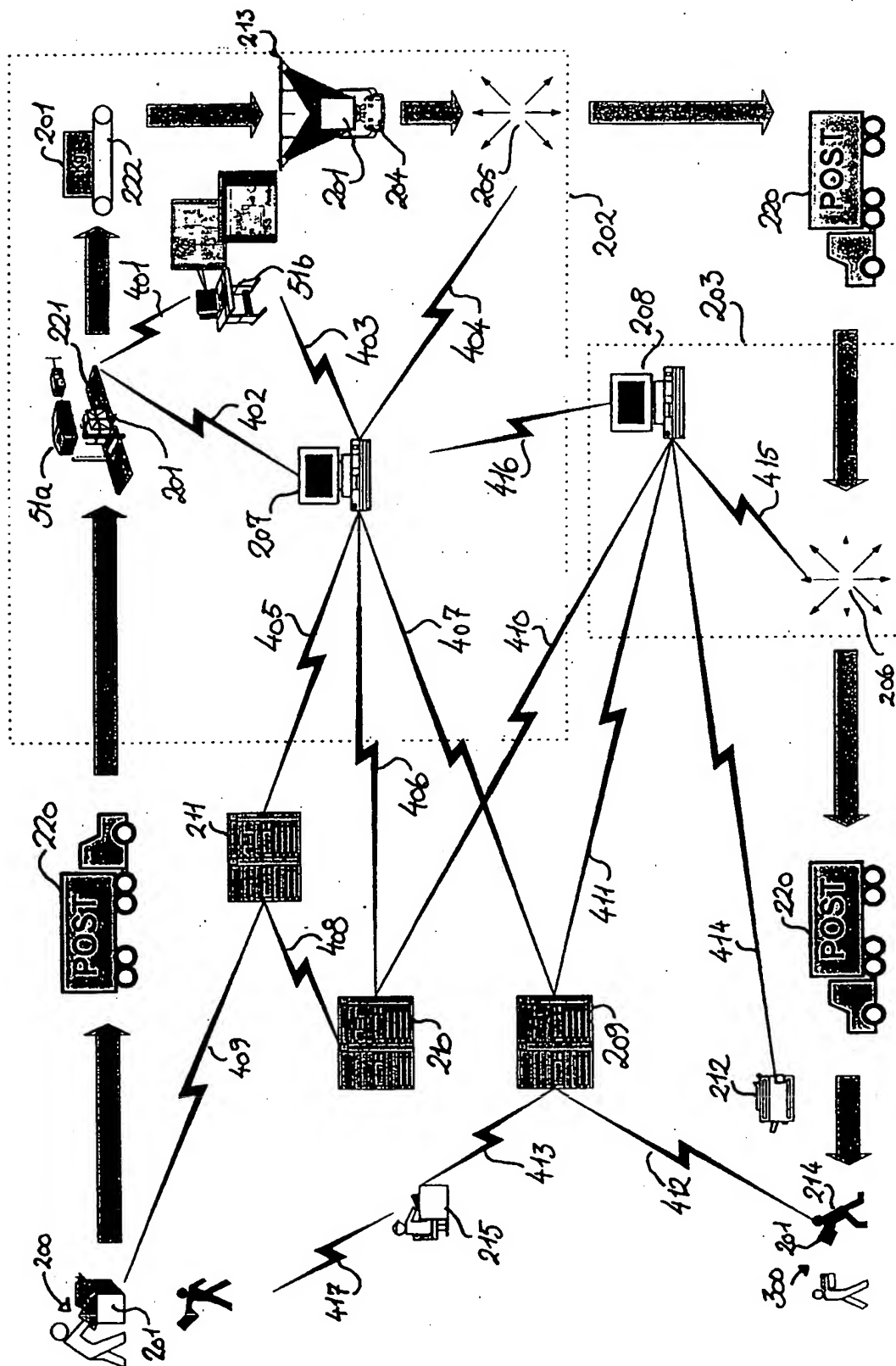
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Fig. 13



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Fig. 14



INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/DK 99/00369

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B07C3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 613 731 A (NEDERLAND PTT) 7 September 1994 (1994-09-07)	11,12, 14,15, 17, 24-26, 29-34, 39,40, 54-56, 60,62
A	column 2, line 34 -column 7, line 54; claims; figures	1,2,4, 7-9,52
A	EP 0 424 728 A (IBM) 2 May 1991 (1991-05-02) cited in the application the whole document	1-69
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

20 October 1999

Date of mailing of the international search report

29/10/1999

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 99/00369

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 646 364 A (BERTIN & CIE) 2 November 1990 (1990-11-02) the whole document ----	1-69
X	EP 0 425 890 A (SYSTEL INT SPA) 8 May 1991 (1991-05-08) the whole document ----	70-72
X	DE 196 16 130 A (HANNIG WOLF DIETER DIPL ING ;SCHULZ MICHAEL (DE)) 16 October 1997 (1997-10-16) column 1, line 61 -column 3, line 45; claims ----	73-75
A	US 4 832 204 A (HANDY STEVEN W ET AL) 23 May 1989 (1989-05-23) ----	1-72
A	US 4 058 217 A (COLE PETER HAROLD ET AL) 15 November 1977 (1977-11-15) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PL/DK 99/00369

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0613731	A	07-09-1994	NL 9300403 A	03-10-1994
EP 0424728	A	02-05-1991	US 5031223 A	09-07-1991
			CA 2021664 A,C	25-04-1991
			DE 69016572 D	16-03-1995
			DE 69016572 T	10-08-1995
			DK 424728 T	26-06-1995
			JP 1969578 C	18-09-1995
			JP 3137975 A	12-06-1991
			JP 6094026 B	24-11-1994
FR 2646364	A	02-11-1990	EP 0422195 A	17-04-1991
			WO 9012660 A	01-11-1990
EP 0425890	A	08-05-1991	IT 1236733 B	31-03-1993
			DE 69028272 D	02-10-1996
			DE 69028272 T	23-01-1997
			US 5147048 A	15-09-1992
DE 19616130	A	16-10-1997	NONE	
US 4832204	A	23-05-1989	NONE	
US 4058217	A	15-11-1977	CA 1019690 A	25-10-1977
			DE 2421316 A	14-11-1974
			FR 2227907 A	29-11-1974
			GB 1432274 A	14-04-1976
			JP 1170648 C	17-10-1983
			JP 50069761 A	10-06-1975
			JP 57058997 B	13-12-1982